Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – MAY 2025

Date: 29-05-2025 **Time:** 09:30 am – 12:30 pm

School: SOE	**Program:** B. Tech (EEE)	
Course Code: EEE3010	**Course Name:** Electrical Estimation and Costing	
Semester: VI	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	CO1	CO2	CO3	CO4	CO5
Marks	20	20	30	30	-

Instructions:

(i) Read all questions carefully and answer accordingly.

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

Part A

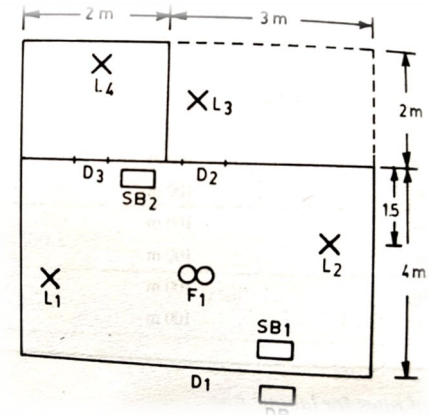
Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

1.	List the two main configurations of transmission lines.	2 Marks	L1	CO3
2.	Define load calculation in distribution systems?	2 Marks	L1	CO3
3.	List the type of transmission line is usually used in urban areas to reduce visual pollution?	2 Marks	L1	CO3
4.	List two components of a typical distribution system.	2 Marks	L1	CO3
5.	State the typical unit of measurement for conductor cost estimation?	2 Marks	L1	CO3
6.	Define a substation	2 Marks	L1	CO4
7.	List any two major components of an outdoor substation.	2 Marks	L1	CO4
8.	State the standard voltage level of a distribution substation.	2 Marks	L1	CO4
9.	List any two major components of an outdoor substation.	2 Marks	L1	CO4
10.	List the main criteria for selecting a substation transformer.	2 Marks	L1	CO4

Part B

Answer the Questions. **Total Marks 80M**

11.	a.	The Cooper & Aluminum cables are two types of cables that have wide applications in an industrial installation. The current carrying rating is determined by the conductor size and the thermal heating of the cable. The cable spacing, application and insulation materials are relevant to the dissipation of this heat. Summarize the difference between Copper Cables & Aluminum Cables with various parameters as per the BIS standards.	10 Marks	L2	CO1
	b.	Consider a small workshop using a 10 HP motor. Calculate the appropriate type and rating of fuse for the motor as per IS code, and explain the consequences of using an underrated fuse.	10 Marks	L3	CO1
		Or			
12.	a.	In a housing colony, lighting and power points were connected under one circuit. The MCB trips frequently. Explain the general rules for sub-circuit determination and how this issue could have been avoided with necessary example.	10 Marks	L2	CO1
	b.	Calculate the required cross-sectional area of aluminum wire for a 5 kW load with a distance of 60 m, considering a voltage drop limit of 5%. Show all steps and formulas used. Consider the resistivity of aluminum ρ =2.82×10^−6 Ω-m	10 Marks	L3	CO1

13.	a.	Explain the basic components and working principles of a Lightning Protection System (LPS).	10 Marks	L2	CO2
	b.	Estimate the total load for a 12-story residential building with the following given data: Lighting load: 2 kW per floor Power socket load: 3 kW per floor HVAC load: 5 kW per floor.	10 Marks	L3	CO2
		Or			
14.	a.	The Figure 1 shows the plan of small flat. The flat is to be provided with electrical connections. The position of light and fan points and switch boards have been shown in the figure. i. Decide the number of sub-circuit and show these in the installation plan. ii. Calculate the size and length of wire required for the wiring installation. iii. Estimate the quantity of material, its cost and labour cost for teak wood batten wiring system. In figure 1 D1, D2, D3 represents doors.  Figure. 1. Layout plan of small flat	20 Marks	L3	CO2

15.	**a.**	Explain the differences between Transmission (High Voltage) and Distribution (Low Voltage) Systems.	10 Marks	L2	**CO3**
	b.	Estimate the main material requirement for 750m, 415/240 volts three phase line with four wires in vertical configuration. the lines emanate from a substation to feed a load of 30 kw. Take the span of two poles as 50m, the size of the conductor is ACSR 6/1x2.59 mm (code weasel)	10 Marks	L3	**CO3**
		Or			
16.	**a.**	Assume you are a project engineer in charge of planning and executing a 110 kV single circuit overhead transmission line to connect a new 110/33 kV substation at 'Solaria Industrial Estate' to the existing 220/110 kV substation at 'Lakemount'. The proposed route is approximately 18 kilometers long, passing through the following types of terrain: i. 12 km plain agricultural land ii. 4 km moderately hilly terrain iii. 2 km forest fringe with environmental restriction Due to the upcoming solar park and industrial loads in Solaria, the utility requires the project to be completed within 12 months. To ensure high reliability, lightning protection and robust tower design are essential. Specifications of the project are: Voltage: 110 kV, Conductor: ACSR Moose, Tower: Galvanized Steel Lattice Towers, Earth Wire: Overhead Ground Wire- Substations: One bay extension at each end Compliance: CERC and IS standards. Prepare the following tasks; i. Estimate number and type of towers, Calculate approximate conductor and earth wire length, suggest environmental clearances needed for forest section. ii. Prepare Cost of Estimation iii. Project Execution Planning iv. Technical Design Choices	20 Marks	L3	**CO3**

17.	**a.**	During the commissioning of a new substation, the earth resistance needs to be measured. Explain the step-by-step procedure of the earth resistance test and interpret what a high value implies.	10 Marks	L2	CO4
	b.	For a residential area with a 100 kVA load, a pole-mounted outdoor 11 kV/415 Volts Substation is set to be installed. Determine the cable size needed to connect the transformer to the distribution box and calculate the quantity and cost of materials required for the installation.	10 Marks	L3	CO4
		Or			
18.	**a.**	A utility company plans to establish a new substation near a congested urban area. The area has limited land availability but demands high power reliability. Based on the scenario, explain	10 Marks	L2	CO4

		whether an indoor or outdoor substation is more suitable and justify your answer with 3 reasons.			
	b.	As an engineer you are assigned to design the grounding system for a new 33/11 kV substation being built in a small town. The substation has transformers and switchgear, and your task is to design an earthmat that ensures safety and reliability during faults. Parameter — Value Soil resistivity (ρ) — 100 Ω·m Fault current (If) — 8 kA Fault clearing time (t) — 1 second Substation size — 30 m × 20 m Depth of burial — 0.5 m Material for conductors — Copper	10 Marks	L3	CO4