Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – December 2025

Date: 15 – 12- 2025 **Time:** 09:30am – 12:30pm

School: SOE	**Program:** B.Tech.
Course Code: EEE1200	**Course Name:** Basics of Electrical and Electronics Engineering
Semester: I	**Max Marks**: 100 / **Weightage**: 50%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Marks	**24**	**20**	**18**	**20**	**18**

Instructions:

(i) Read all questions carefully and answer accordingly.

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

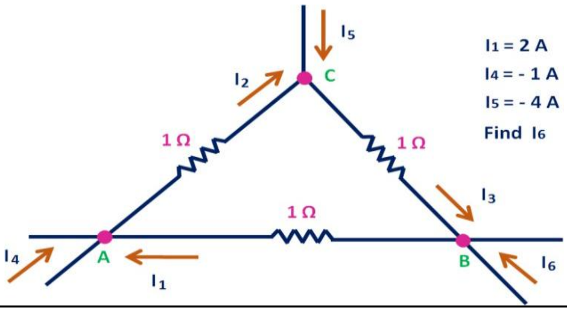
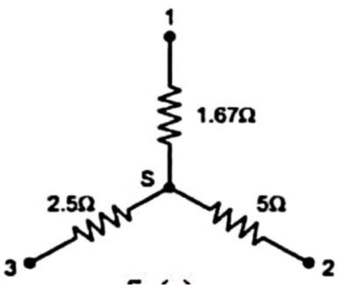
Part A

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

1.	Write the equivalent resistance when two resistors are connected in series?	**2 Marks**	**L1**	**CO1**
2.	When a DC voltage source is connected across a resistor. What will the power (P) in the circuit be when the applied voltage is V and the current flow through the circuit is I?	**2 Marks**	**L2**	**CO1**
3.	With a neat waveform, define i) Frequency, ii) Time period.	**2 Marks**	**L1**	**CO2**
4.	In a power distribution system supplying domestic appliances, outline the differences between the RMS value and the average value of an AC supply, highlighting their practical applications.	**2 Marks**	**L1**	**CO2**
5.	Classify the different types of 3-phase Induction motors based on their rotor construction.	**2 Marks**	**L2**	**CO3**
6.	A company plans to automate its small manufacturing unit and is exploring different types of motors. Identify the suitable applications where a BLDC motor can be used in this scenario.	**2 Marks**	**L1**	**CO3**
7.	Identify the types of semiconductors available in electronic components when selecting suitable materials for basic device applications.	**2 Marks**	**L1**	**CO4**
8.	Describe the current (I_D) flow through a PN junction diode.	**2 Marks**	**L2**	**CO4**
9.	List out the applications of a transistor.	**2 Marks**	**L1**	**CO5**
10.	Name the three configurations of a BJT?	**2 Marks**	**L1**	**CO5**

Part B

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

11.	**a.**	State and explain Ohm's law with a neat diagram. Mention its limitations.	**06 Marks**	**L2**	CO1
	b.	For the given circuit, find the current I_6. 	**04 Marks**	**L3**	CO1
Or					
12.	**a.**	State and explain Kirchhoff's Voltage Law with a neat circuit diagram and equation.	**06 Marks**	**L2**	CO1
	b.	Convert the star network into a delta network? 	**04 Marks**	**L3**	CO1

13.	**a.**	Apply Kirchhoff's Current Law at a circuit point, determine the current flows in each branch with a neat diagram.	**06 Marks**	**L3**	CO1
	b.	In a household LED lighting circuit, two resistors are connected in parallel to limit current to different sections of the lamp. Illustrate with a neat diagram how the total current divides between the two resistors and how the voltage is shared across them in this parallel arrangement	**04 Marks**	**L2**	CO1
Or					
14.	**a.**	The field winding of a DC electromagnet is wound with 960 turns and has a resistance of 50Ω when the exciting voltage is 230V. The magnetic flux linking the coil is 0.005 Wb. Calculate the self-inductance of the coil?	**06 Marks**	**L3**	CO1
	b.	In an electric vehicle's motor control circuit, a sudden change in current occurs when the driver rapidly accelerates or releases the accelerator. Using this scenario, describe the concept of self-inductance in the motor coil and explain how the induced EMF opposes the change in current, with the support of an illustrative diagram.	**04 Marks**	**L2**	CO1

15.	**a.**	In a small wind-energy generator, a coil rotates between the poles of a permanent magnet. Using this scenario, interpret how the AC waveform is induced in the rotating coil and draw the corresponding waveform, clearly labeling all key points.	**06 Marks**	**L3**	CO2
	b.	A three-phase balanced star-connected system is used to supply power for a balanced load. Calculate the phase voltage if the line	**04 Marks**	**L3**	CO2

		voltage is 460V, given that the system is a three-phase balanced star-connected system.			
		Or			
16.	**a.**	In a residential heating system that operates on a purely resistive load, demonstrate how to compute the voltage, current, and power by analyzing the circuit diagram and corresponding waveforms.	**06 Marks**	**L3**	**CO2**
	b.	Given an industrial load connected in a three-phase delta configuration. For this condition, determine the line and phase voltages, currents, and total power consumed, and justify how these calculated values support efficient power delivery in practical applications.	**04 Marks**	**L3**	**CO2**
17.	**a.**	The equation for an alternating current is given by $\boldsymbol{i} = \mathbf{28.28}\boldsymbol{sin}(\mathbf{314}\boldsymbol{t} + \mathbf{30°})\ \boldsymbol{A}$. Find its rms value, frequency, and phase angle.	**06 Marks**	**L3**	**CO2**
	b.	Given an industrial distribution system where space constraints and load characteristics vary across different sections, apply your understanding to compare core-type and shell-type transformers and justify which type would be more suitable for each section based on their construction and performance characteristics.	**04 Marks**	**L3**	**CO3**
		Or			
18.	**a.**	Given a three-phase star-connected industrial distribution system supplying balanced loads, illustrate how the relationship between voltage, current, and power is applied to determine line voltage, line current, and total power consumed in the network.	**06 Marks**	**L3**	**CO2**
	b.	A 400kVA, 11000/415V, 50Hz single-phase, step-down transformer used in the distribution system has 80 turns on the secondary. Determine, a. Rated primary and secondary currents b. Number of primary turns	**04 Marks**	**L3**	**CO3**
19.	**a.**	Explain the construction and working of a single-phase transformer with a neat diagram.	**06 Marks**	**L2**	**CO3**
	b.	A transformer is used for a step-down voltage application. It has the primary winding turns, N_1 = 500, secondary winding turns, N_2 = 100, and primary winding voltage, V_1 = 220 V. Calculate secondary winding voltage(V_2) and ii) transformation ratio(K).	**04 Marks**	**L3**	**CO3**
		Or			
20.	**a.**	In an industrial ventilation system where robust and low-maintenance motors are required. With a neat diagram, explain the working principle of a squirrel-cage induction motor that operates in this application context.	**06 Marks**	**L2**	**CO3**
	b.	A single-phase transformer has primary and secondary windings with 100 and 20 turns, respectively. The transformer is connected to a 50 Hz, 220V supply. Find the maximum flux in the core.	**04 Marks**	**L3**	**CO3**

21.	**a.**	In a low-voltage rectifier circuit used for converting AC to DC in small power supplies, illustrate with a neat diagram how a PN junction diode is constructed and explain its working under forward-bias conditions.	**6 Marks**	**L2**	**CO4**
	b.	A germanium diode is used in a rectifier circuit and is operating at a temperature of 25°C with a reverse saturation current of 1mA. Calculate the value of the forward current if it is forward-biased by 0.22V.	**4 Marks**	**L4**	**CO4**
		Or			
22.	**a.**	In a low-voltage rectifier circuit used for converting AC to DC in small power supplies, illustrate with a neat diagram how a PN junction diode is constructed and explain its working under reverse-bias conditions.	**6 Marks**	**L2**	**CO4**
	b.	Analyze how a Zener diode operates as a voltage regulator in an electronic instrumentation system where stable DC output is required despite load variations, using the concept of Zener breakdown to justify its suitability for such regulation applications.	**4 Marks**	**L4**	**CO4**

23.	**a.**	A rectifier circuit is used to convert AC to DC voltage. With a neat diagram, explain the operation of a full-wave rectifier. And write the rectified output waveform.	**6 Marks**	**L2**	**CO4**
	b.	Apply the characteristics of BJTs and MOSFETs to an industrial control circuit requiring fast switching and high power efficiency, and illustrate how each device would perform in terms of switching speed, input requirements, and thermal behavior.	**4 Marks**	**L3**	**CO5**
		Or			
24.	**a.**	The diode current equation describes the response of current through a diode to the voltage applied across it. Write the diode current equation and explain the parameters in the diode current equation.	**6 Marks**	**L2**	**CO4**
	b.	In a DC power supply system that must deliver a constant output voltage despite fluctuations in input voltage, illustrate how a Zener diode can be applied to regulate the voltage. Describe the scenario and justify how the Zener diode maintains stable operation in such applications	**4 Marks**	**L3**	**CO5**

25.	**a.**	In a transistor-based amplifier design that must meet specific gain and biasing requirements, demonstrate how to plot the input and output characteristics of a CE-configured BJT using suitable diagrams, and interpret how these characteristics influence the circuit's performance in real-world applications.	**10 Marks**	**L3**	**CO5**
		Or			
26.	**a.**	Consider an electronic control system that relies on an NPN transistor for switching loads. Using a neat diagram, examine the transistor's construction and describe how its switching action regulates the connected load.	**10 Marks**	**L3**	**CO5**