Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – MAY 2025

Date: 31-05-2025 **Time:** 01:00 pm – 04:00 pm

School: SOE	**Program**: B. Tech	
Course Code: ECE2015	**Course Name**: Circuit Analysis	
Semester: II	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	CO1	CO2	CO3	CO4	CO5
Marks	30	28	42		

Instructions:

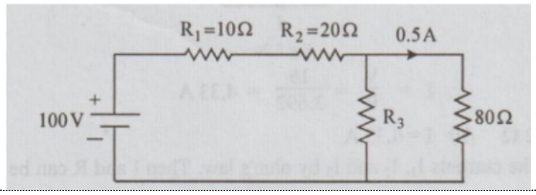
(i) Read all questions carefully and answer accordingly.

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

Part A

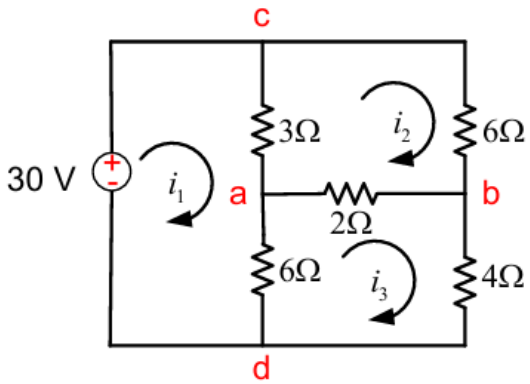
Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

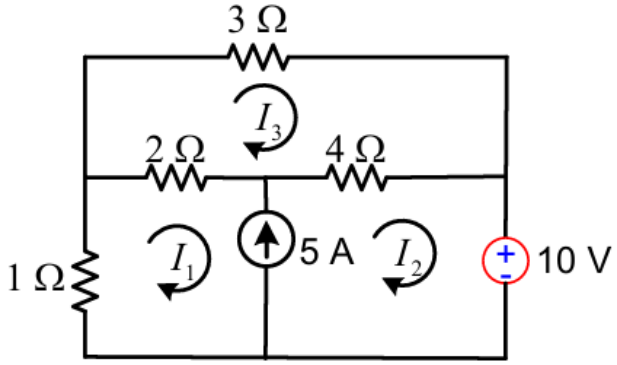
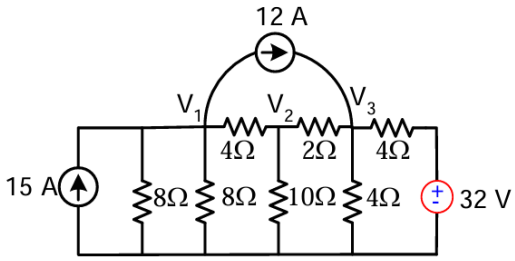
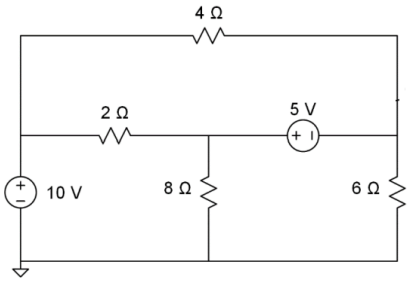
1.	The choice between a unilateral or bilateral element depends on the specific requirements of the circuit being designed. Define bi-lateral and uni-lateral elements with examples.	**2 Marks**	**L1**	**CO1**
2.	Active and passive networks are two fundamental categories of electrical networks used in various applications, including telecommunications, signal processing, and circuit design. Define Active and Passive elements with examples.	**2 Marks**	**L1**	**CO1**
3.	Network elements are the basic components that form the structure and functionality of a circuit. Define linear and non-linear elements. Identify whether a diode is a linear or non-linear element.		**L1**	**CO1**
4	Convert a 2 A current source in parallel with a 5 Ω resistor into an equivalent voltage source.	**2 Marks**	**L2**	**CO1**

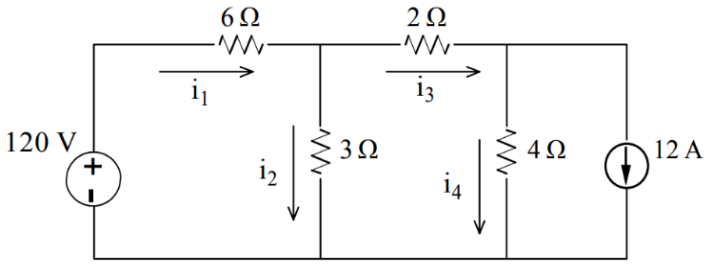
5.	The voltage across the element is linearly proportional to the current through it. Evaluate total equivalent resistance of the circuit.  	**2 Marks**	**L2**	**CO1**
6.	Thevenin's theorem is used in electrical engineering to simplify circuit analysis. It is used to analyze circuits with multiple sources and resistors. Define Thevenin's Theorem.	**2 Marks**	**L1**	**CO2**
7.	Superposition theorem can be used when trying to analyze a linear circuit with multiple voltage and current sources. Define super position theorem.	**2 Marks**	**L1**	**CO2**
8.	Network theorems are fundamental tools in electrical circuit analysis, used to simplify complex networks and predict their behavior. Define maximum power transfer theorem and the condition for maximum power delivered to load.	**2 Marks**	**L1**	**CO2**
9.	Network analysis is the process of finding the voltages across, and the currents through, all network components. Define Norton's theorem.	**2 Marks**	**L1**	**CO2**
10.	Write the general form of h-parameter equations. Name two applications of h- parameters.	**2 Marks**	**L1**	**CO3**

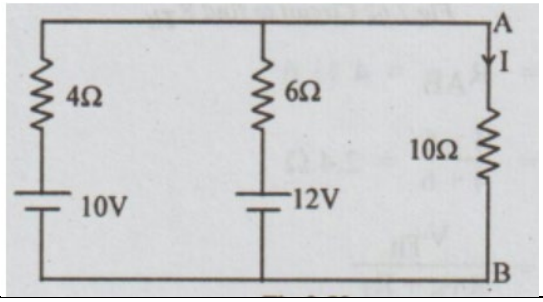
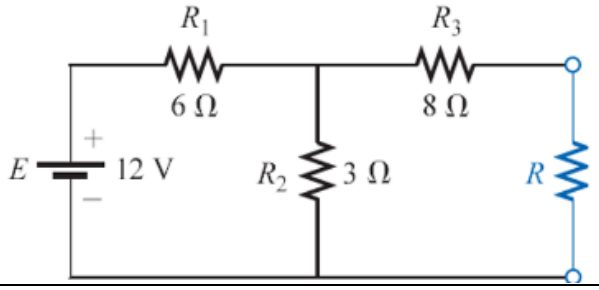
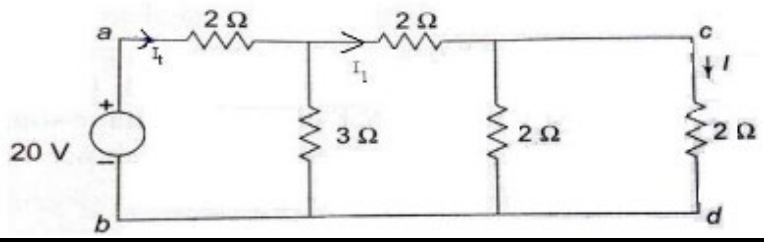
Part B

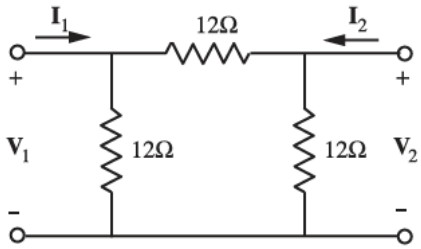
Answer the Questions. **Total Marks 80M**

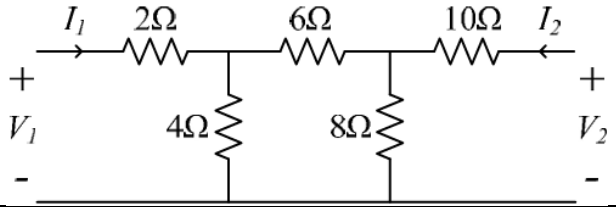
11.	**a.**	Mesh analysis is a circuit analysis technique that calculates the current flowing through a circuit. Evaluate i_1, i_2, i_3 using mesh analysis.  	**20 Marks**	**L3**	**CO1**

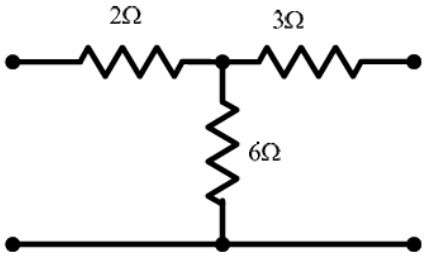
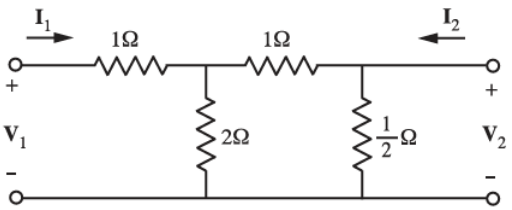
	b.	Super-mesh analysis is a technique used in electrical circuit analysis to simplify mesh analysis when a current source is shared between two meshes. Determine loop current using super mesh analysis.  		**L3**	**CO1**
		Or			
12.	**a.**	Nodal Analysis is a systematic method for analyzing circuits using node voltage as circuit variables. In simple words, this method is used for determining the voltage between nodes. Evaluate the node voltages V_1, V_2, V_3 using Nodal analysis.  	**20 Marks**	**L3**	**CO1**
	b.	A super node is a generalized node that combines multiple nodes in a circuit or network. Evaluate the node voltages using super node analysis.  		**L3**	**CO1**

13.	**a.**	The Superposition Theorem allows to analyze a circuit with multiple voltage or current sources by considering the effect of each source separately while treating the others as inactive. Using superposition evaluate i_1, i_2, i_3, i_4 using cramer's rule.  	**20 Marks**	**L3**	**CO2**

	b.	Thevenin's Theorem is one of the fundamental Network theorems that is used to solve a given electrical network. Evaluate the current I in the network by using Thevenin's theorem. 		**L3**	**CO2**
		Or			
14.	**a.**	The power delivered to the load is maximized when the load impedance is the complex conjugate of the source impedance. Find the value of R_L for maximum power transfer in the circuit and also find the maximum power. 	**20 Marks**	**L3**	**CO2**
	b.	Norton's theorem is used to simplify complex circuit analysis, particularly when analyzing the behavior of a circuit with a variable load. Find the current through the resistance R_L for the circuit shown in the figure below using Norton's equivalent circuit. 		**L3**	**CO2**

15.	**a.**	Z-parameters relate the input and output voltages to the input and output currents, representing the impedance characteristics of the network. Determine the z parameter for the circuit. 	**20 Marks**	**L3**	**CO3**
	b.	A two-port network is an electrical circuit with two pairs of terminals, one for input and one for output. Determine the z-parameters in terms of ABCD-parameter.		**L3**	**CO3**
		Or			

16.	**a.**	Y parameters, also known as admittance parameters or short-circuit parameters, are used in electrical engineering to describe the behavior of linear electrical networks. Determine the y parameter for the circuit. 	**20 Marks**	**L3**	**CO3**
	b.	Network parameters mathematically describe the behavior of the two-port network by relating the input and output voltages and currents. Determine the y-parameters in terms of h-parameter.		**L3**	**CO3**

17.	**a.**	ABCD parameters are a set of constants that characterize the behavior of a two-port network, like a transmission line. Determine the ABCD parameters for the circuit. 	**20 Marks**	**L3**	**CO3**
	b.	A two-port network is a mathematical model used to describe electrical circuits that have two pairs of terminals: one pair for input and one pair for output. Determine the ABCD-parameters in terms of z-parameter.		**L3**	**CO3**
		Or			
18.	**a.**	H-parameters are one system for characterizing bipolar transistors. Determine the h-parameters for the circuit shown in figure. 	**20 Marks**	**L3**	**CO3**
	b.	The h-parameters of a transistor will give you a good idea what it can do, how to use it effectively in a circuit, and whether it is appropriate for a particular circuit. Determine the h-parameters in terms of z-parameter.		**L3**	**CO3**