Roll No.											

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – December 2025	
Date: 11 – 12- 2025	**Time:** 09:30am – 12:30pm

School: SOE	**Program:** B. Tech-EEE	
Course Code: EEE2500	**Course Name:** Network Theory	
Semester: III	**Max Marks**:100	**Weightage**: 50%

CO - Levels	CO1	CO2	CO3	CO4	CO5	CO6
Marks	24	24	14	14	14	10

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 active and passive elements used in electric circuits.	2 Marks	L1	CO1
2.	Define an independent source and give one example.	2 Marks	L1	CO1
3.	State the condition for maximum power transfer in a DC circuit.	2 Marks	L1	CO2
4.	State why Thevenin’s theorem is useful for circuits with a varying load.	2 Marks	L1	CO2
5.	Recall the Laplace transform of the current in an RL circuit excited by a step input.	2 Marks	L1	CO3
6.	State the expression for the transient voltage in an RC circuit.	2 Marks	L1	CO3
7.	Define resonance in an RLC circuit.	2 Marks	L1	CO4
8.	State the significance of resonant frequency in AC circuits.	2 Marks	L1	CO4
9.	What are ABCD parameters in transmission-type networks?	2 Marks	L1	CO5
10	What are Y-parameters and where are they used?	2 Marks	L1	CO5

Part B

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

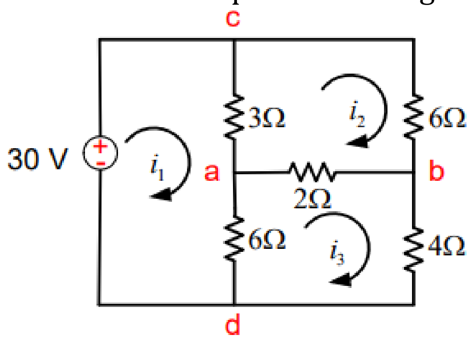
<table>
<tr><td>11.</td><td>a.</td><td>Apply mesh analysis to determine the mesh currents $\boldsymbol{i_1}, \boldsymbol{i_2}, \boldsymbol{i_3}$ in the circuit and compute the voltage across the 2 Ω resistor.


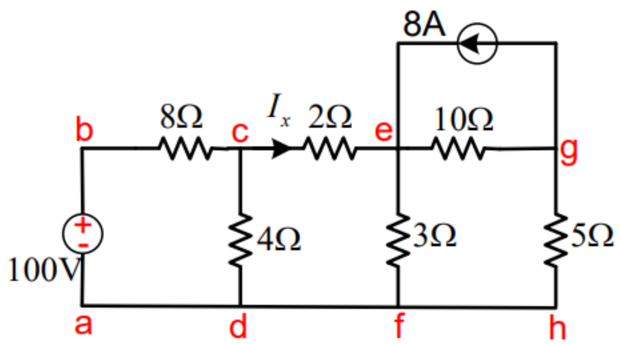
Fig. 1.1</td><td>10 Marks</td><td>L3</td><td>CO1</td></tr>
<tr><td></td><td>b.</td><td>Apply nodal analysis to calculate the current I_x in the circuit shown in Fig 1.2.


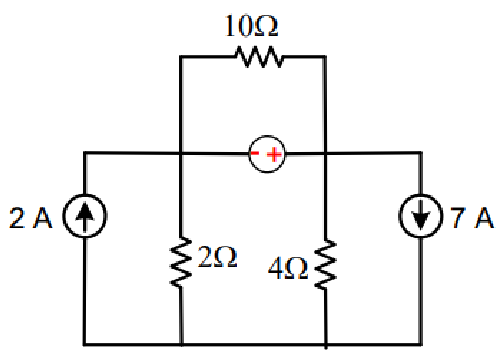
Fig. 1.2</td><td>10 Marks</td><td>L3</td><td>CO1</td></tr>
<tr><td colspan="6">Or</td></tr>
<tr><td>12.</td><td>a.</td><td>Apply nodal analysis method to find all node voltages in the circuit of Fig. 1.3, and include the equations and steps used in the analysis.


Fig. 1.3</td><td>10 Marks</td><td>L3</td><td>CO1</td></tr>
<tr><td></td><td>b.</td><td>Determine the current I in the circuit of Fig. 1.4 using a suitable circuit analysis method. Show each step clearly and justify the</td><td>10 Marks</td><td>L3</td><td>CO1</td></tr>
</table>

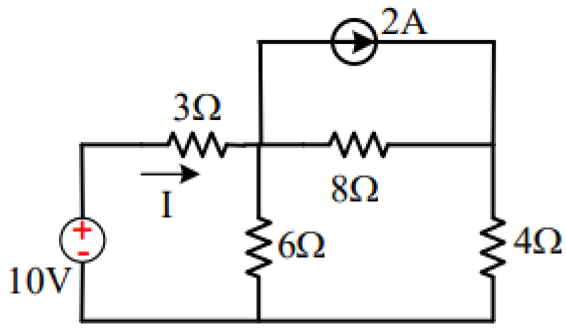
<table>
<tr><td></td><td></td><td>choice of the method used.


Fig 1.4</td><td></td><td></td><td></td></tr>
</table>

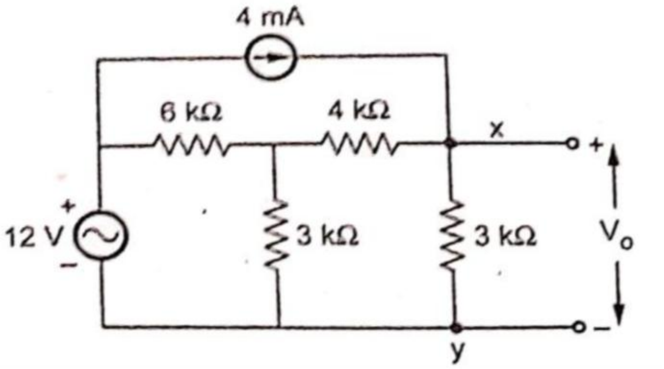
<table>
<tr><td>13.</td><td>a.</td><td>Apply Thevenin's theorem to the network shown in Fig. 1.5 and determine the Thevenin equivalent voltage $V_{th}$and Thevenin equivalent resistance R_{th}seen at terminals X–Y. If a 5 Ω load is connected across X–Y, calculate the load current and the power dissipated in the 5 resistor.


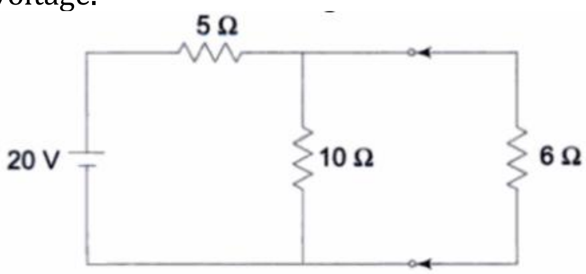
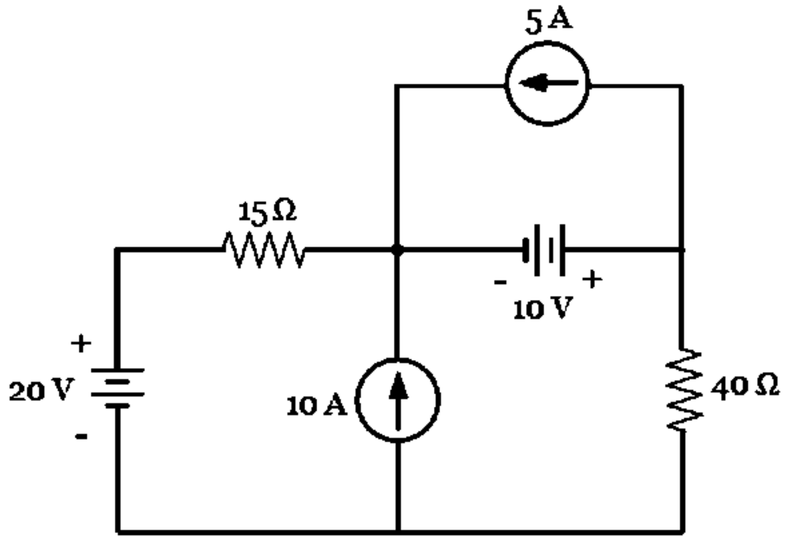
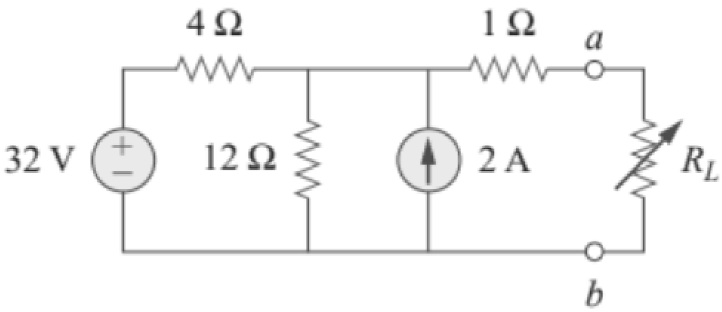
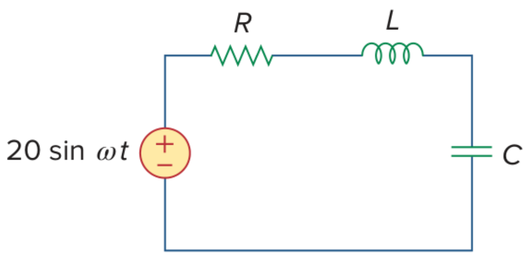
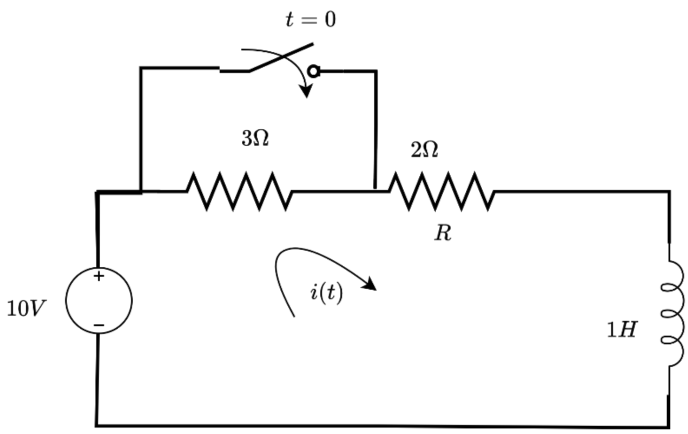
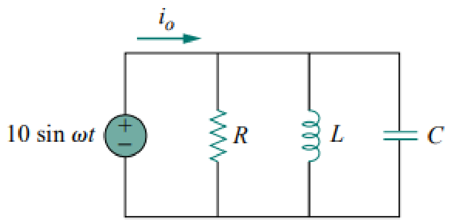
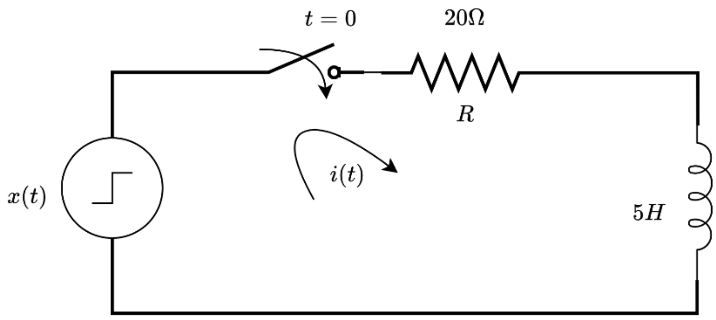
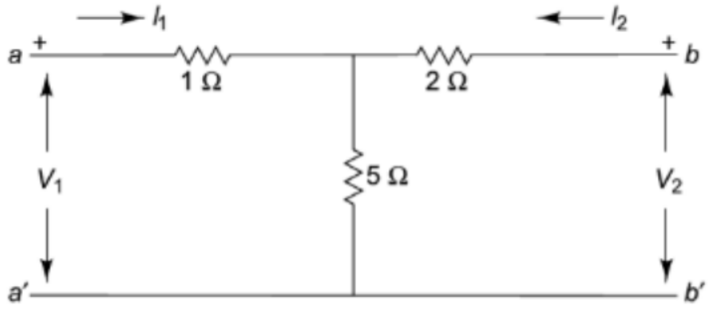
Fig. 1.5</td><td>10 Marks</td><td>L3</td><td>CO2</td></tr>
<tr><td></td><td>b</td><td>Apply Norton's theorem to determine the voltage across the 6 Ω resistor in the circuit shown in Fig. 1.6. Clearly show the steps involved in finding Norton current, Norton resistance, and the final load voltage.


Fig. 1.6</td><td>10 Marks</td><td>L3</td><td>CO2</td></tr>
<tr><td colspan="6" align="center">Or</td></tr>
<tr><td>14.</td><td>a.</td><td>Utilize the superposition theorem to determine the voltage across the 15 Ω resistor in the circuit shown in Fig. 1.7, including</td><td>10 Marks</td><td>L3</td><td>CO2</td></tr>
</table>

		the required statement and steps of the theorem.  **Fig. 1.7**			
	b.	Apply Thevenin's theorem to determine the Thevenin equivalent across the load resistor R_L in the circuit shown in Fig. 1.8.  **Fig. 1.8**	**10 Marks**	**L3**	**CO2**
15.	**a.**	In the circuit of Fig. 2.0, R = 2Ω, L = 1 mH, and C = 0.4 μF. (i) Calculate the resonant frequency (ii) Calculate the quality factor and bandwidth.  **Fig 2.0**	**10 Marks**	**L3**	**CO4**
	b.	Consider the circuit shown in Fig. 1.9 and utilize the Laplace transform method to express the transient response of $i(t)$.	**10 Marks**	**L3**	**CO3**

		 **Fig. 1.9**			
Or					
16.	**a.**	In the parallel RLC circuit shown in Fig. 2.0, let R = 8 k &, L = 0.2 mH, and C = 8 µF. (a) Calculate ω_0, Q, and B. (b) Find ω1 and ω2.  **Fig.2.0**	**10 Marks**	**L3**	**CO4**
	b.	Apply the Laplace transform for the circuit shown in Fig. 2.1 excited by step input $x(t)$ and obtain the transient response for $i(t)$.  **Fig. 2.1**	**10 Marks**	**L3**	**CO3**

17.	**a.**	Determine the voltages, currents, and total power in a balanced three-phase system with a delta-connected load**.**	**10 Marks**	**L3**	**CO6**
	b.	Apply transmission parameters to determine the ABCD parameters of the network shown in Fig. 2.2, and show the steps	**10 Marks**	**L3**	**CO5**

		relating V_1, I_1 at the input to V_2, I_2 at the output.  Fig. 2.2			
Or					
18.	**a.**	A three phase, balanced delta connected load of $(4 + j8)\Omega$ is connected across a 400V, 3ϕ balanced supply. Determine phase current and line currents. Assume the three-phase sequence to be RYB. Also calculate the power drawn by the load.	**10 Marks**	**L3**	**CO6**
	b.	Utilize the concept of open-circuit impedance (Z) parameters to determine each parameter and formulate the standard Z-parameter equations for a two-port network.	**10 Marks**	**L3**	**CO5**