U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

April 2024 Semester End Main Examinations

Programme: B.E.
Branch: ES Cluster (EEE/ET/ECE/EIE/MD)
Course Code: 19ES3CCECA
Course: Electrical Circuit Analysis

Semester: III
Duration: 3 hrs.
Max Marks: 100

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

<table>
<tr><th></th><th></th><th>UNIT - I</th><th>CO</th><th>PO</th><th>Marks</th></tr>
<tr><td>1</td><td>a)</td><td>Reduce the network shown in the Fig.1(a) to a single voltage source in series with a resistance using source shifting and source transformations.

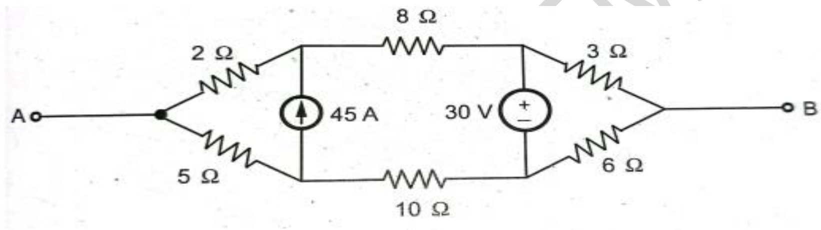


Fig.1(a)</td><td>CO1</td><td>PO1</td><td>06</td></tr>
<tr><td></td><td>b)</td><td>In the circuit shown in Fig.1(b), determine the equivalent voltage source across the terminals M-N using source transformations.

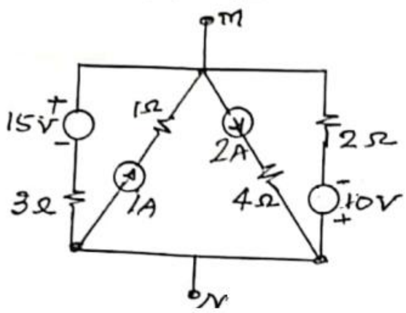


Fig.1(b)</td><td>CO1</td><td>PO1 ,2</td><td>07</td></tr>
<tr><td></td><td>c)</td><td>In the circuit shown in Fig.1(c), find all the loop currents by mesh analysis.

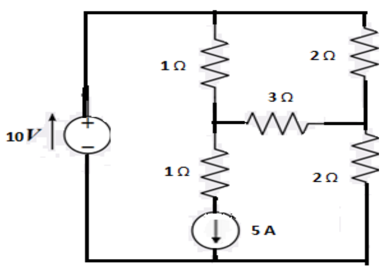
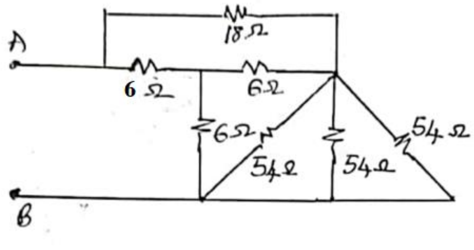
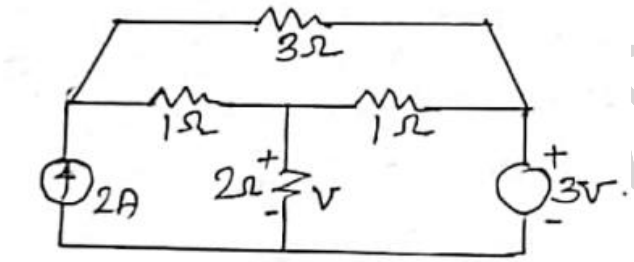
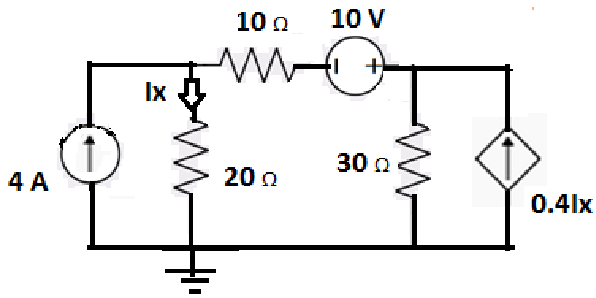
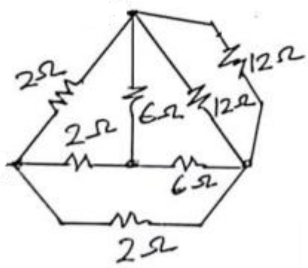
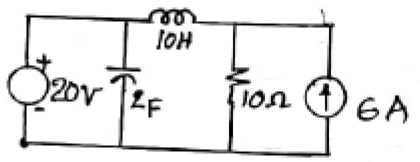
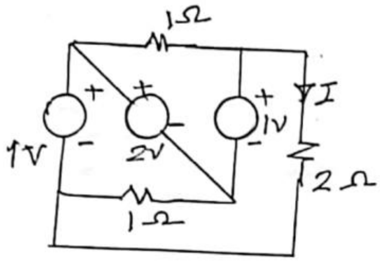
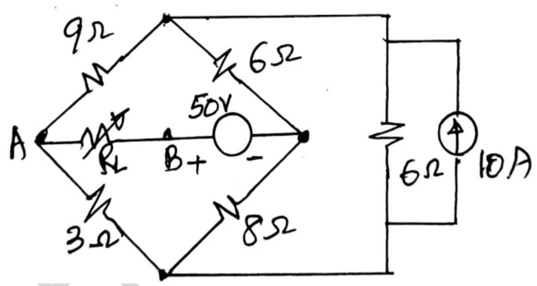
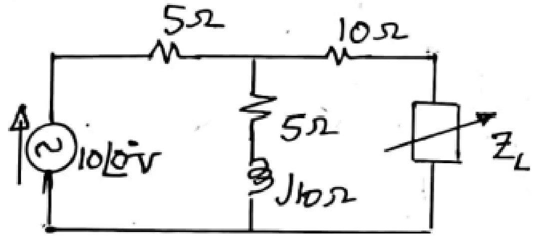
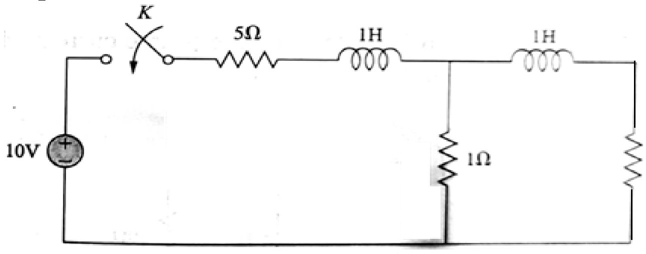
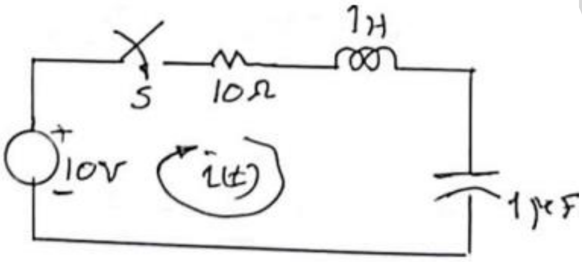
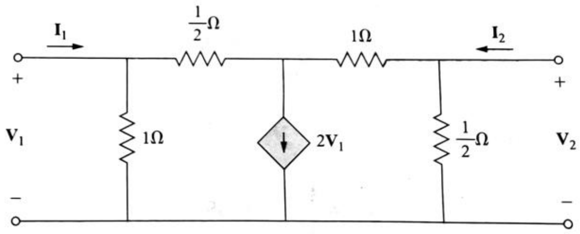
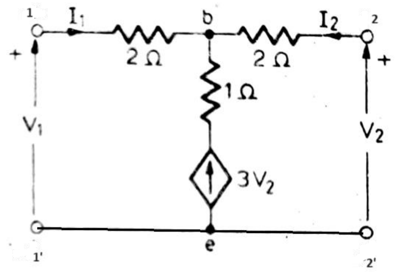


Fig. 1(c)</td><td>CO1</td><td>PO1 ,2</td><td>07</td></tr>
</table>

			OR			
	2	a)	Find the voltage to be applied across the terminals A-B of the network shown in fig. 2a, such that the current drawn by the circuit is 10 A.  Fig.2(a)	*CO1*	*PO1 ,2*	**06**
		b)	Using source shifting technique, calculate the voltage V in the network shown in fig.2(b).  Fig.2(b)	*CO1*	*PO1 ,2*	**07**
		c)	In the circuit shown in Fig. 2(c), calculate 'Ix' using node analysis.  Fig.2(c)	*CO1*	*PO1 ,2*	**07**
			UNIT - II			
	3	a)	Obtain an expression for the resonant frequency of a practical parallel resonant circuit, and find the condition at which such a circuit resonates at all frequencies. What happens to this equation if the capacitor is an ideal one?	*CO2*	*PO1*	**08**
		b)	For the network shown in fig. 3(b) draw the graph and select a tree and develop the cut-set and tie-set schedules.  Fig.3(b)	*CO2*	*PO1 ,2*	**08**

		c)	Construct the dual circuit of the network shown in figure 3©, by direct inspection (dot) method.  Fig.3(c)	*CO2*	*PO1 ,2*	**04**
			UNIT - III			
	4	a)	In the circuit shown in Fig.4(a), find the current using Superposition principle.  Fig.4(a)	*CO2*	*PO1 ,2*	**06**
		b)	Obtain the Norton's equivalent circuit of the network shown in Fig. 4(b).  Fig.4(b)	*CO2*	*PO1 ,2*	**06**
		c)	Define the maximum power transfer theorem for a pure variable load resistance and determine the load impedance for maximum power transfer through it and also find the maximum power.  Fig. 4(c)	*CO2*	*PO1 ,2*	**08**
			UNIT - IV			
	5	a)	Briefly explain the behaviour of elements R, L and C at the initial at t = 0+ and final at t = ∞	*CO3*	*PO1*	**06**
		b)	Determine the (i) initial value of $F_1(s) = \frac{(s+1)}{s^2+2s+10}$ and the final value of $F_2(s) = \frac{10}{(s+1)^2+100}$ using the initial and final value theorems and verify the results by any other method.	*CO3*	*PO1 ,2*	**08**

		c)	Sketch the unit step, unit ramp and unit parabolic input signals, write the mathematical equations for each and what is the Laplace transformations.	*CO3*	*PO1 ,2*	**06**
			OR			
	6	a)	Explain the initial condition of resistor and inductor.	*CO3*	*PO1*	**04**
		b)	In the circuit shown the find the second loop current I_2 using Laplace transformations with all the initial conditions zero. 	*CO3*	*PO1 ,2*	**08**
		c)	What are initial conditions and what is its importance and in the circuit shown in fig.6© the switch is closed at t=0 with zero initial conditions. Find i, Di and D^2i at t = 0+  Fig.6c	*CO3*	*PO1 ,2*	**08**
			UNIT - V			
	7	a)	Obtain expressions for representing the Z-parameters in terms if T-parameters.	*CO4*	*PO1*	**06**
		b)	Define h-parameters and find the y-parameters of the network shown in fig.7(b).  Fig.7(b)	*CO4*	*PO1 ,2*	**07**
		c)	Define T-parameters and find the h - parameters of the network shown in Fig. 7c  Fig.7c	*CO4*	*PO1 ,2*	**07**

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