U.S.N.										

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

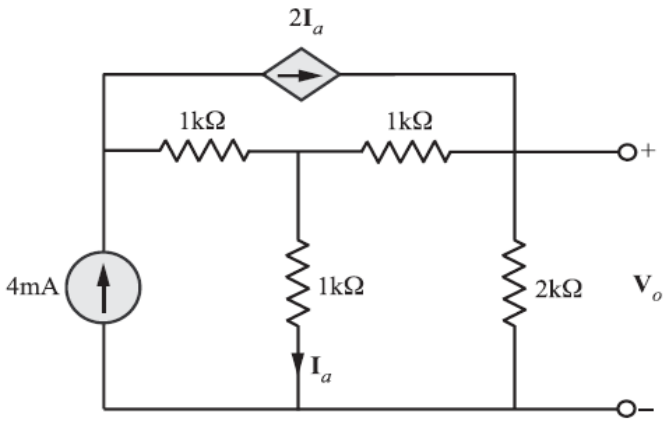
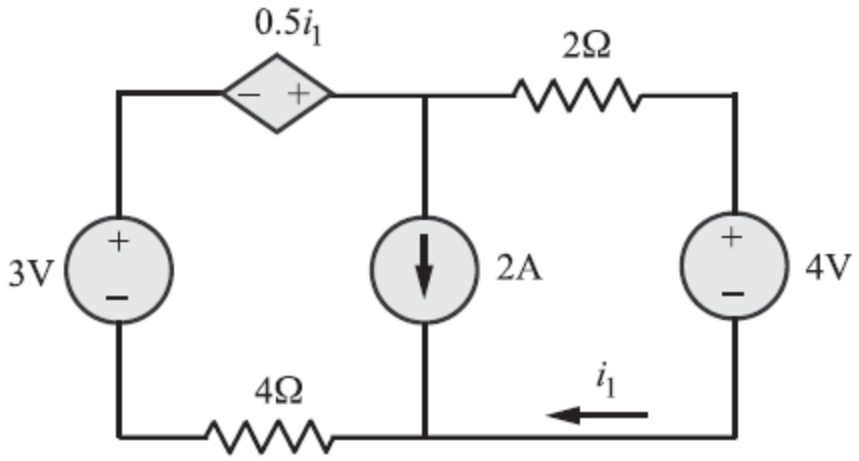
Autonomous Institute Affiliated to VTU

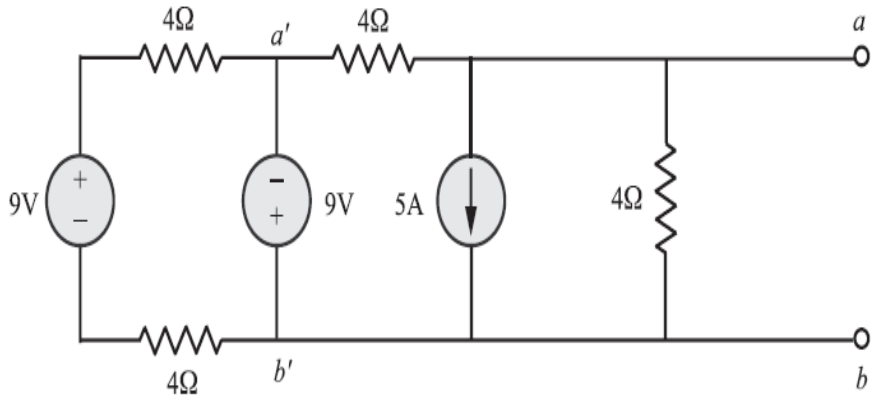
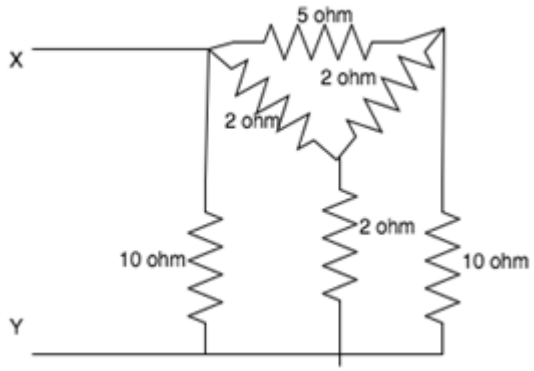
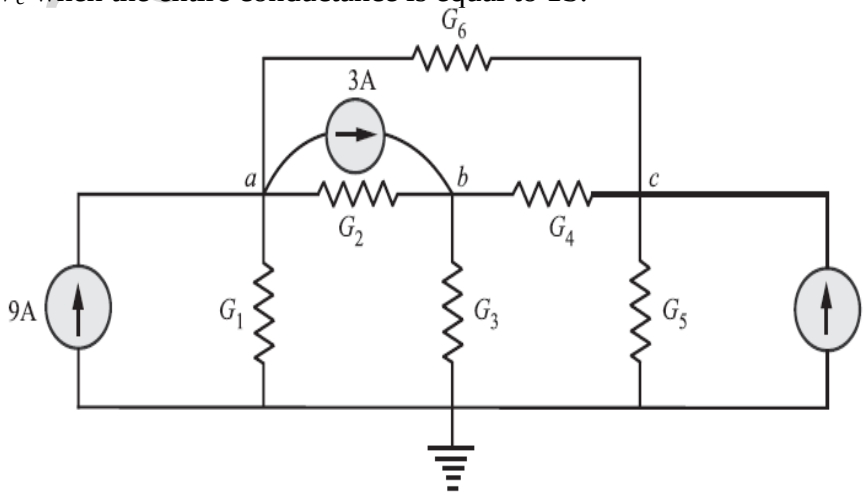
January / February 2025 Semester End Main Examinations

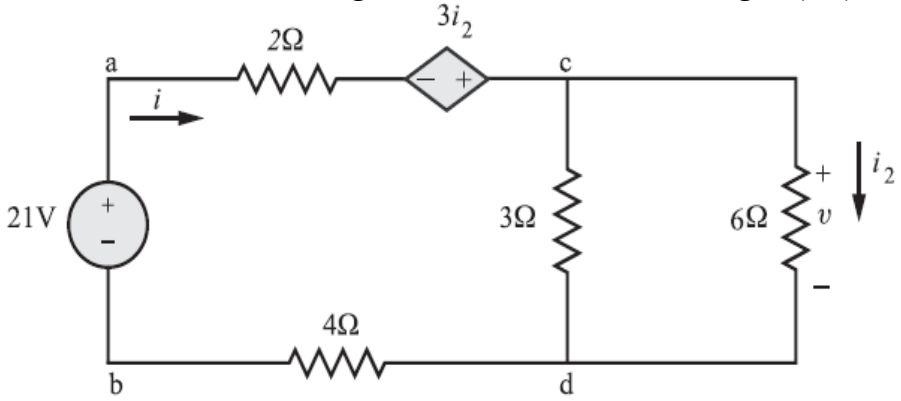
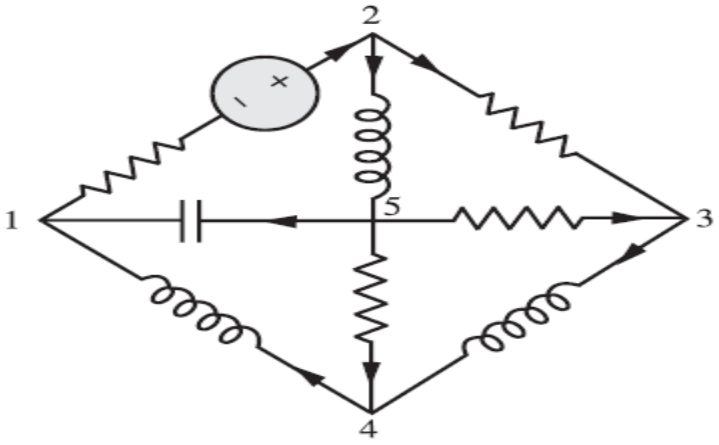
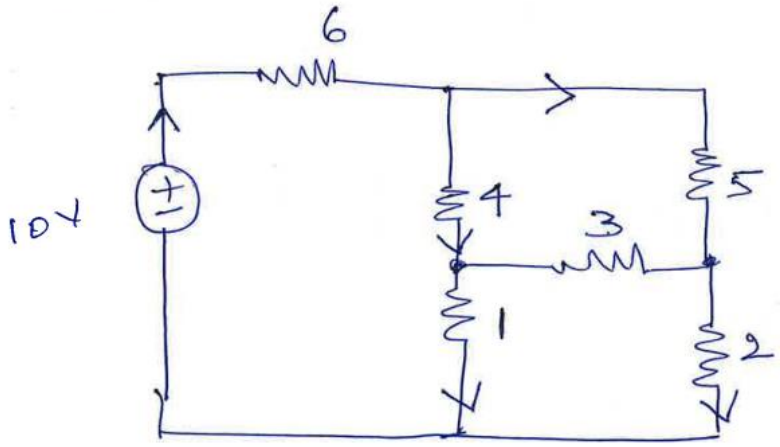
Programme: B.E. **Semester: III**
Branch: ETE, EIE **Duration: 3 hrs.**
Course Code: 22ES3PCECA **Max Marks: 100**
Course: Electric Circuit Analysis

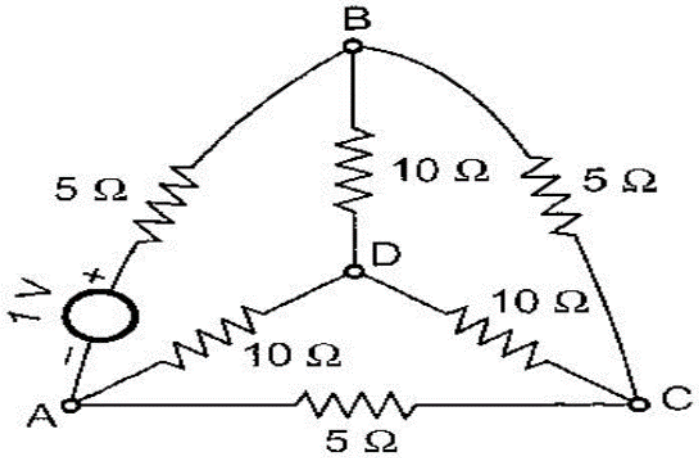
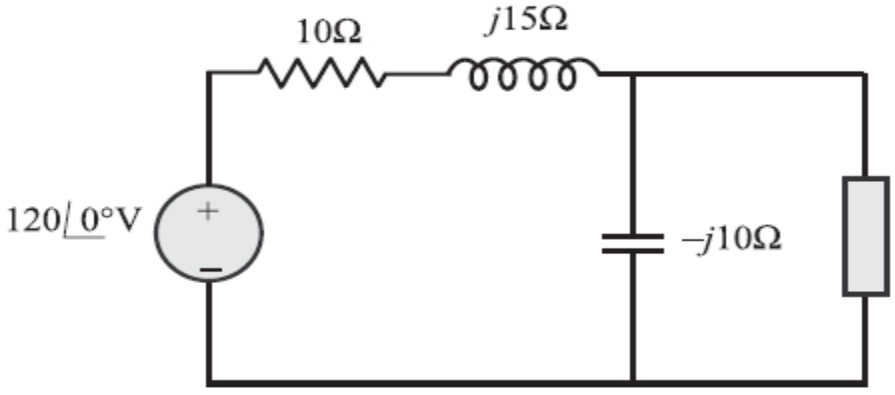
Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

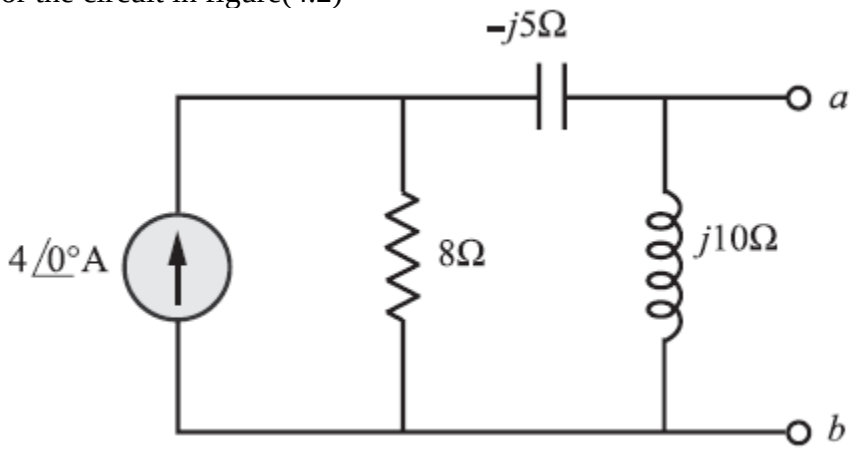
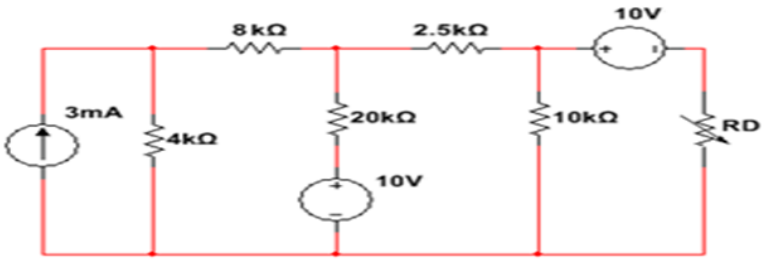
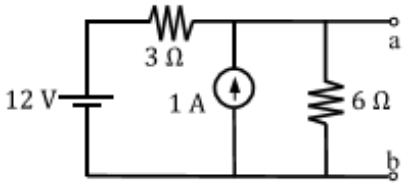
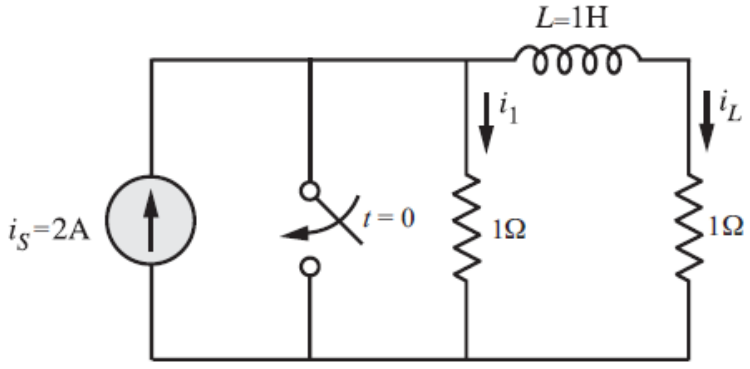
Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

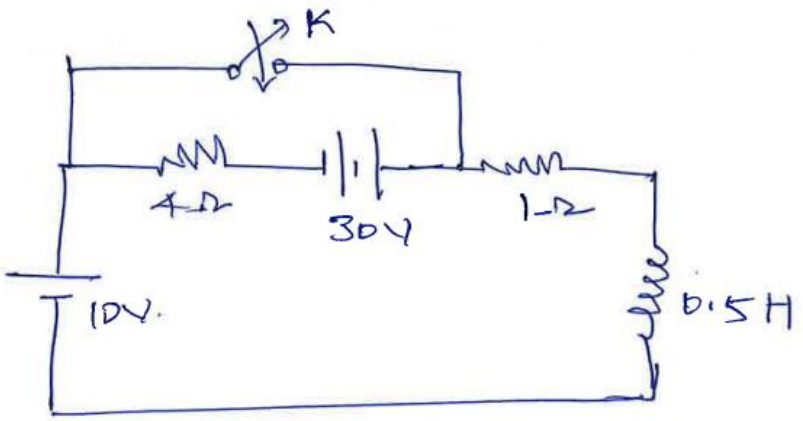
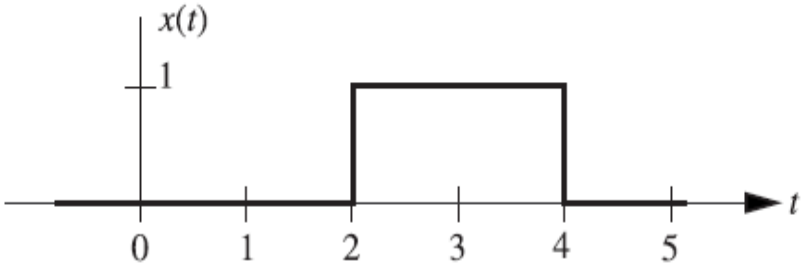
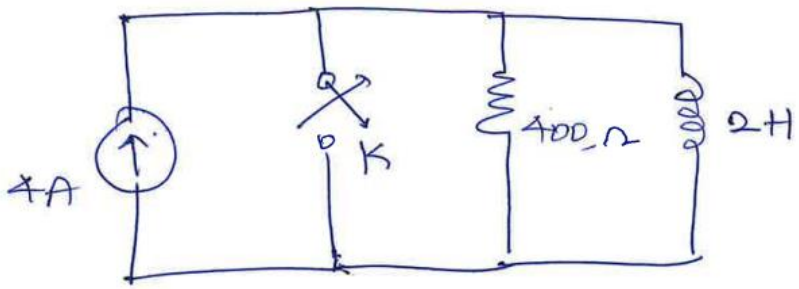
		UNIT - I	CO	PO	Marks
1	a)	Determine V_o using mesh analysis for the circuit shown in figure(1.1)  Figure(1.1)	CO2	PO1	06
	b)	Referring to the circuit shown in figure (1.2) Determine the current i_1.  Figure(1.2)	CO2	PO1	08

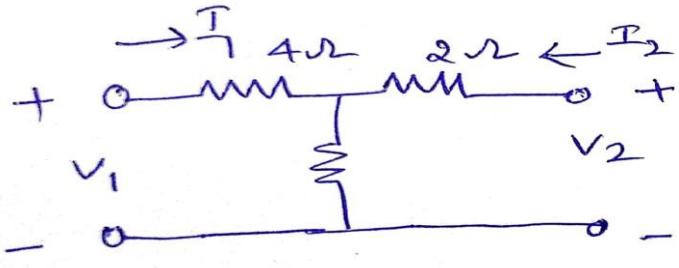
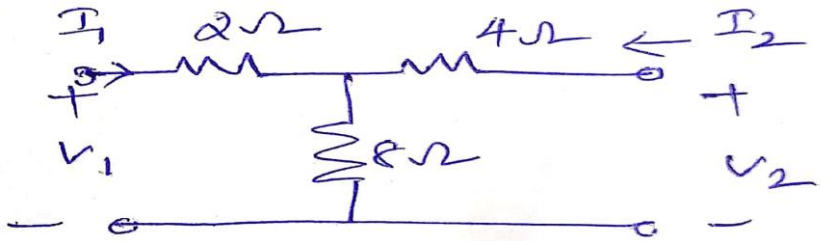
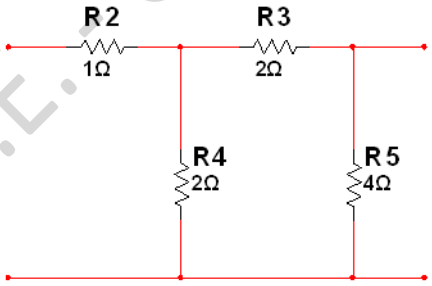
		c)	Use source transformation to convert the circuit shown in figure (1.3) to a single current source in parallel with a single resistor.  Figure(1.3)	CO2	PO1	06
			OR			
	2	a)	Find the equivalent resistance between X and Y for the circuit shown in figure(2.1)  Figure(2.1)	CO2	PO1	06
		b)	Refer the circuit shown in figure (2.2).Find the three node voltage V_a V_b V_c when the entire conductance is equal to 1S.  Figure(2.2)	CO2	PO1	08

		c)	Find the current i_2 and voltage v for the circuit shown in figure(2.3)  Figure(2.3)	CO2	PO1	06
			UNIT - II			
	3	a)	Refer to the network shown in figure (3.1).Obtain the corresponding incidence matrix.  figure(3.1)	CO2	PO1	06
		b)	In the network given below, consider branches 1, 3, 4 forming a tree. Write a tie set schedule and hence write equilibrium equations on loop current basis and find the values of loop current. Consider that the branch number indicates value of resistance in that branch.  Figure(3.2)	CO2	PO1	08

		c)	A series RLC circuit consists of R=1K of an inductance of 100mH in series with a capacitance of 10pF. If 100V is applied as input across the combination determine i) Resonant Frequency ii) Maximum current in the circuit iii) Q factor of circuit iv) Half power frequencies	CO2	PO1	06
			OR			
	4	a)	Show that the resonant frequency is the geometric mean of the two half power frequencies	CO2	PO1	05
		b)	Write the tie set matrix and obtain the network equilibrium equations. Calculate loop currents and branch voltages. Choose AD, BD and CD as tree branches.  	CO2	PO1	10
		c)	A series RLC circuit consists of R= 100Ω, L= 0.02 H and C= 0.02μF. Calculate the frequency of resonance. A variable frequency sinusoidal voltage of value 50V is applied to the circuit. Find the frequency at which voltage across C is maximum.	CO2	PO1	05
			UNIT – III			
	5	a)	 Figure(4.1) For the circuit shown in figure(4.1): a)What is the value of Z_L that will absorb the maximum average power? b) What is the value of maximum power?	CO2	PO2	10

		b)	Find the Thevenin and Norton equivalent circuits at the terminal a-b for the circuit in figure(4.2)  Figure(4.2)	CO2	PO2	10
			OR			
	6	a)	Find the value of load resistance for which max power is transferred and find the power transferred to the load.  	CO2	PO2	10
	6	b)	Find the Thevenins equivalent voltage across the terminals a and b of the network.  	CO2	PO2	10
			UNIT - IV			
	7	a)	Refer the circuit shown in figure (5.1) Find i_1 (0^+) and $i_L(0^+)$.The circuit is in steady state for $t<0$.  Figure(5.1)	CO2	PO2	06

		b)	The switch is closed for a long time. Find i_L for all 't' after switch opens at t=0  Figure (5.2)	CO2	PO2	08
		c)	Using the convolution theorem, find the Laplace transform of the following functions i) $F(s) = \frac{1}{S(S+1)}$ ii) $F(s) = \frac{1}{(s-a)^2}$	CO2	PO1	06
			OR			
	8	a)	Find the Laplace Transform of x(t) shown in figure (6.1)  Figure(6.1)	CO2	PO2	06
		b)	In the network, swich is opened at t = 0. At t = 0^+, solve for the values of V, $\frac{dV}{dt}$, and $\frac{d^2v}{dt^2}$  	CO2	PO2	10
		c)	State and prove convolution theorem.	CO2	PO1	04

			UNIT – V			
	9	a)	Determine the admittance parameters of the T network as shown in figure 7.1  Figure(7.1)	**CO2**	**PO1**	**10**
		b)	Find the hybrid parameters for the two port network shown in figure(7.2)  Figure(7.2)	**CO2**	**PO1**	**10**
			OR			
	10	a)	Find the h parameters of the network and give its equivalent circuit.  	**CO2**	**PO1**	**10**
		b)	The Z-Parameters of a two port network are Z11 = 20Ω, Z22= 30Ω, Z12= Z21 = 10Ω. Find the Y-Parameters and ABCD parameters 10	**CO2**	**PO1**	**10**

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