PES UNIVERSITY

PES University, Bengaluru

(Established under Karnataka Act No. 16 of 2013)

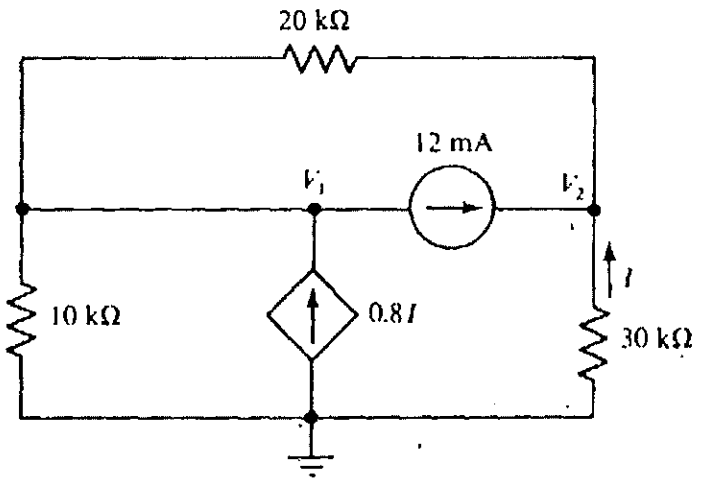
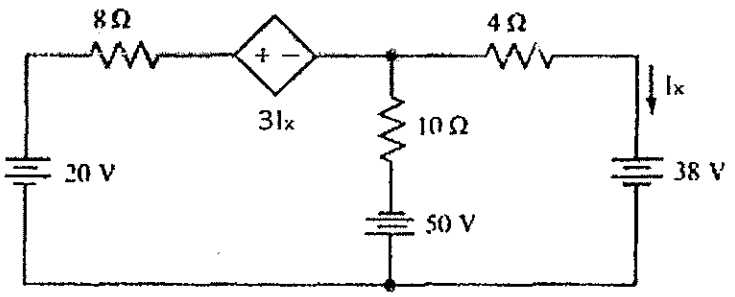
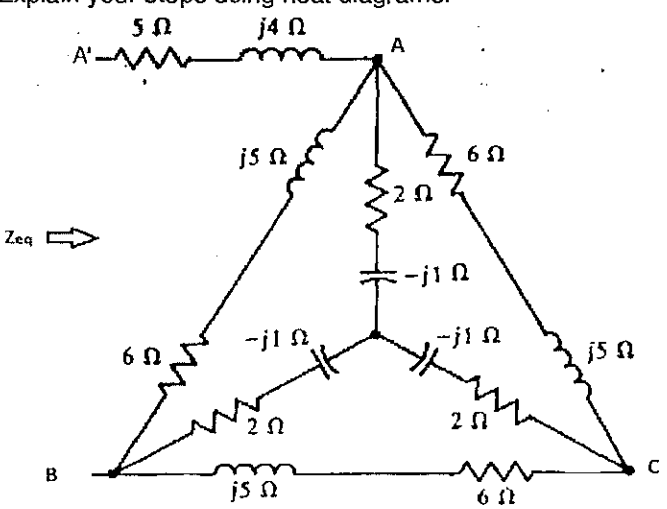
UE19EC202

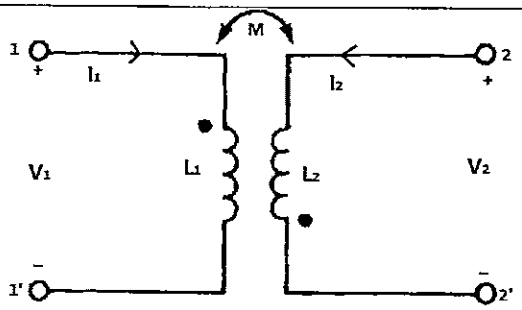
OCTOBER 2020: IN SEMESTER ASSESSMENT B Tech III SEMESTER

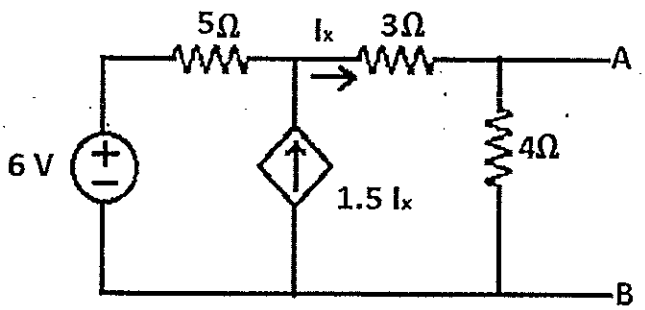
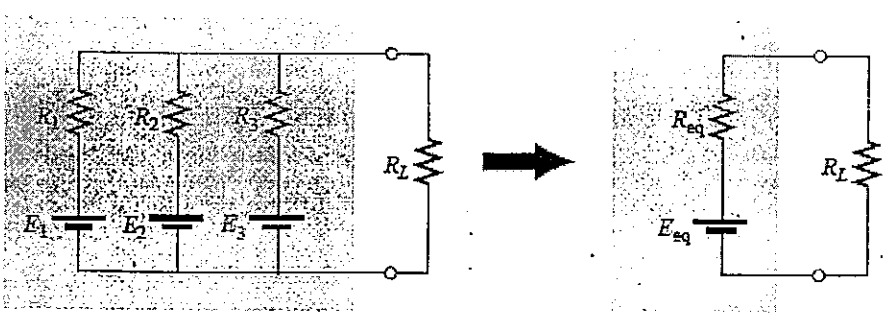
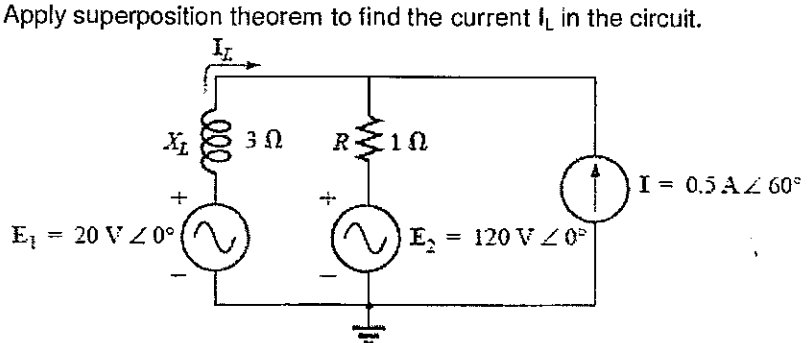
TEST – 1.

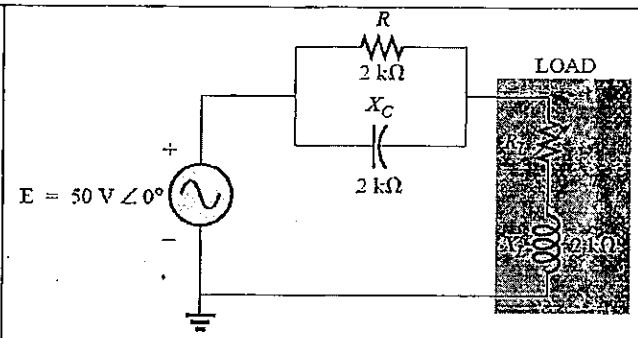
UE19EC202 (4 credit) - NETWORK ANALYSIS AND SYNTHESIS

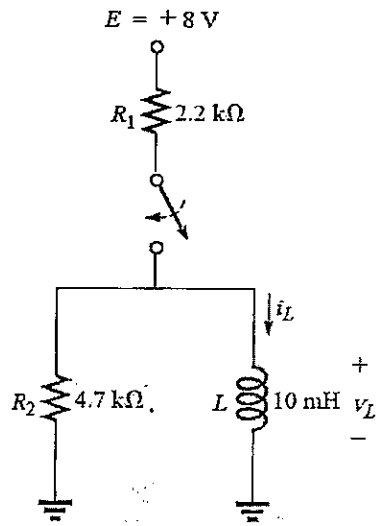
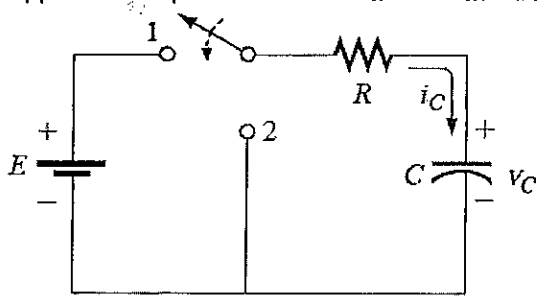
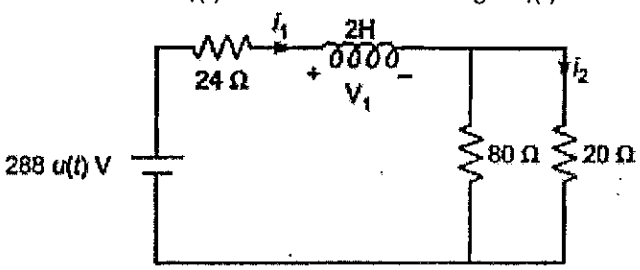
Time: 2 Hrs	Answer All Questions	Max Marks: 60

1.	a)	Find the nodal voltages V_1 and V_2 in the circuit given below using neat steps. 	5
	b)	What is the type of dependent source given in the circuit below? Determine the mesh currents in the given circuit. 	5
2.	a)	Apply star-to-delta conversion and find the equivalent resistance seen through terminals A'-B. Explain your steps using neat diagrams. 	5
	b)	Consider the coupled circuit given below. Write the relation between the self inductances and mutual inductance. Write the mesh equations for the circuit.	5



3.	a)	Determine the Thevenin's equivalent for the circuit seen across terminals a-b 	5
	b)	For the given figure, write suitable expressions for Millman's voltage E_{eq} and Millman's resistance R_{eq}. Can we apply Millman's theorem if one of the voltage sources in the figure was a dependent voltage source? Justify. 	5
4.	a)	Apply superposition theorem to find the current I_L in the circuit. 	5
	b)	Consider the circuit given below where the load resistance is variable. Calculate the optimal load resistance and the maximum power that can be transferred to the load resistance under the following cases: i) when load reactance is fixed; ii) when load reactance is variable.	5



5.	a)	Consider the circuit given below. Suppose the switch closes at t=0, find the time at which the current i_L reaches 70% of the peak value. Find the initial and final values of V_L. 	5
	b)	Consider the circuit shown in the figure. Suppose the switch toggles between position 1 and 2 every 5 time constants. Depict the waveform of the current i_c and voltage v_c of the capacitor. Suppose the capacitance C increases what will happen to these waveforms? 	5
6	a)	The circuit given below shows excitation applied at t=0. The inductor was assumed to be discharged prior to the excitation. Find the transformed response $I_1(s)$. Using $I_1(s)$ find the transient current $i_1(t)$ and the inductor voltage $V_1(t)$ for $t \geq 0$. 	5
	b)	Mathematically express the initial value theorem and final value theorem with respect to the s-domain. Under what condition is the initial value theorem not applicable?	5