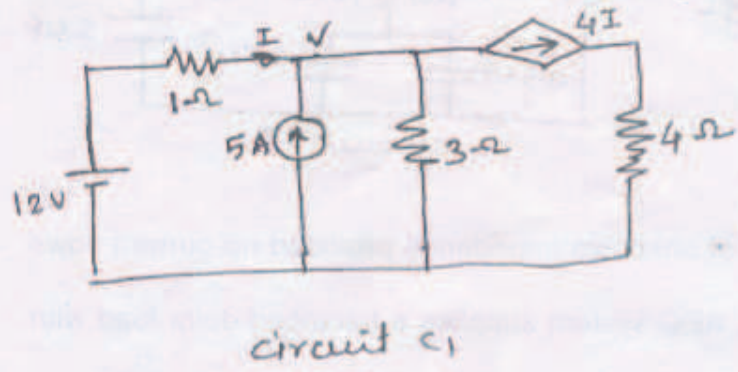


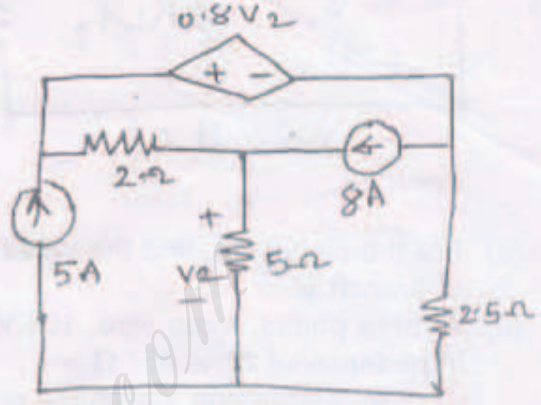
- N.B. (1) Question No. 1 is compulsory.  
 (2) Attempt any four questions from remaining.  
 (3) Assume suitable data if necessary.

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1. (a) For the circuit C1, find the power delivered by dependent current source. 8  
 (b) Use Superposition theorem to find voltage  $v_2$  in circuit C2. 8



circuit c1

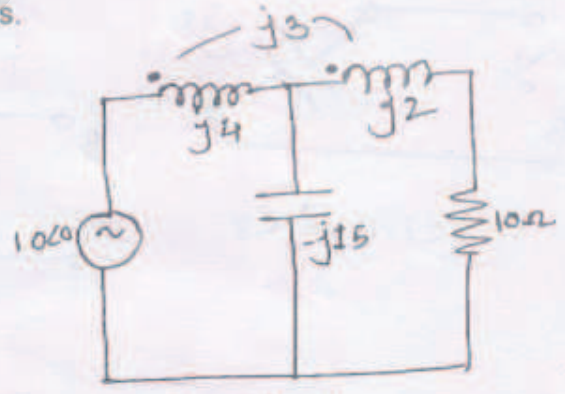


circuit c2

- (c) Write short notes on Initial Conditions. 4

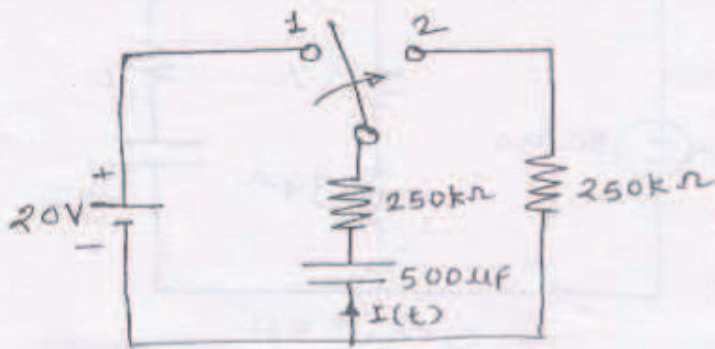
2. (a) Find the drop across 10 Ω resistor for circuit C3.  
 (b) The reduced incidence matrix of an oriented graph is given —  
 (i) Draw the graph.  
 (ii) How many trees are possible ?  
 (iii) Write tieset and cutset matrices.

$$A = \begin{bmatrix} 1 & 0 & 0 & 0 & -1 \\ -1 & -1 & -1 & 0 & 0 \\ 0 & 0 & 1 & -1 & 0 \end{bmatrix}$$

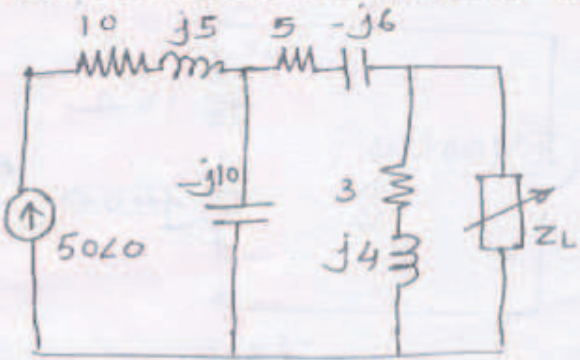


circuit c3

3. (a) Switch in circuit C4, is changed at  $t = 0$  from position 1 to 2, solve for  $i(t)$ .  
 (b) For the circuit C5, determine the maximum power delivered to load impedance  $Z_L$ .



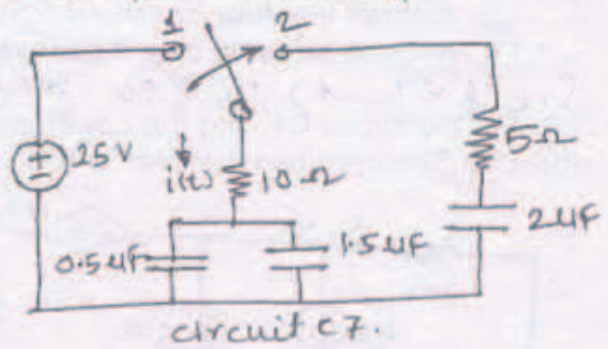
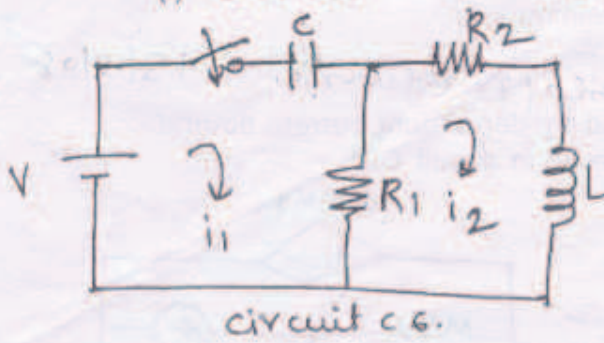
circuit c4



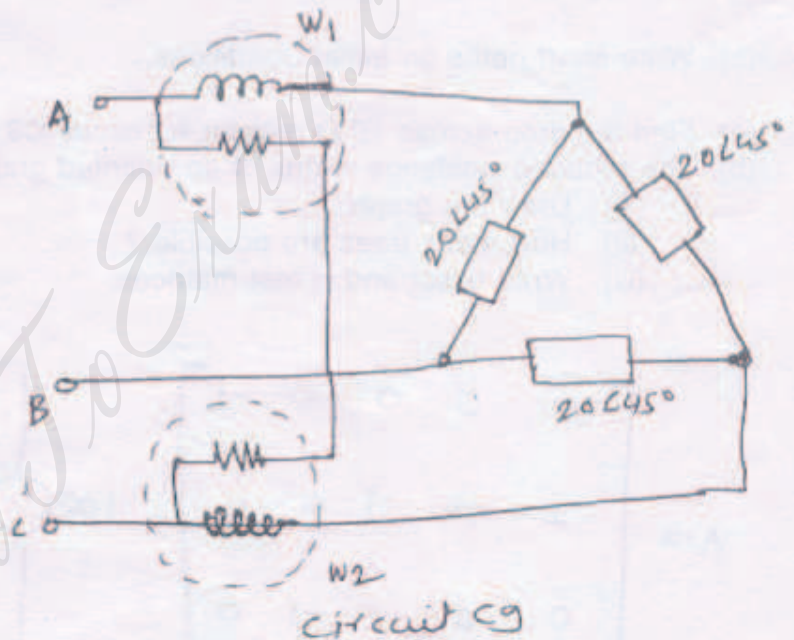
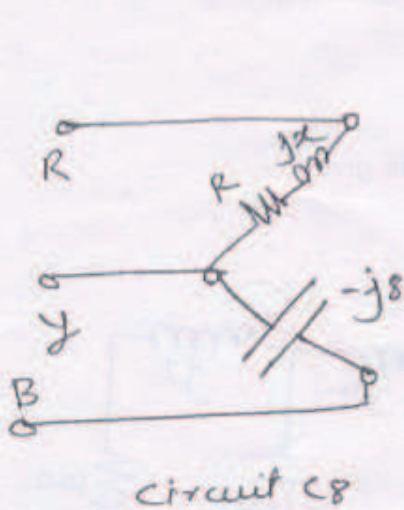
circuit c5

4. (a) Determine  $i_1$ ,  $i_2$ ,  $di_1/dt$ ,  $di_2/dt$ ,  $d^2i_1/dt^2$  and  $d^2i_2/dt^2$  for circuit C6.

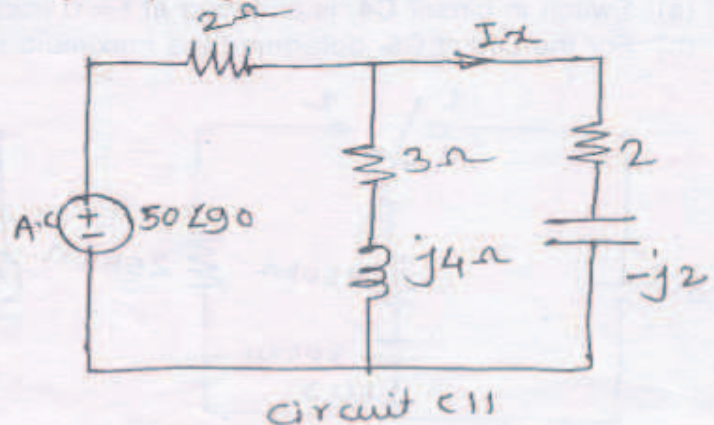
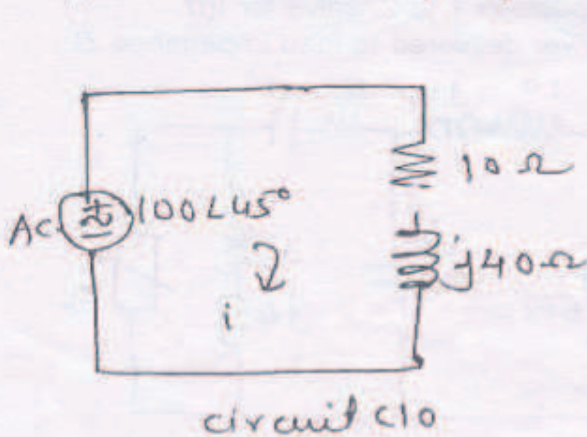
(b) The circuit C7 is in position 1 at  $t = 0$ , after  $t = 3J$  switch is changed to position 2. find the transient current  $i(t)$  for —  
 (i)  $0 < t < 3J$  and (ii)  $t > 3J$  ( $J \rightarrow$  time constant)



5. (a) For the circuit C8, find the value of unknown impedance provided no current flows in branch y.  
 (b) A three phase, three wire, 100 V, ABC system supplies a balanced delta load with impedance of  $20 \angle 45^\circ \Omega$  :—  
 (i) Determine the phase and line currents and draw the phasor diagram.  
 (ii) Find the wattmeter readings when two wattmeter method is used. (Refer C9).



6. (a) Using the Compensation theorem, calculate the change in current in the circuit C10, when reactance is change to  $j35$ .  
 (b) Demonstrate the reciprocity theorem by computing  $I_x$  for circuit C11.



7. (a) Explain how reactive power can be measured with the help of wattmeter.  
 (b) What do you mean by critical resistance, explain the terms over damped, under damped and critically damped system with respect to series RLC circuit.