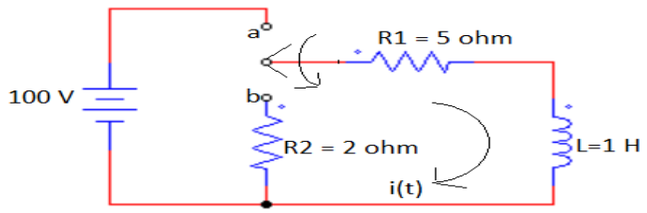
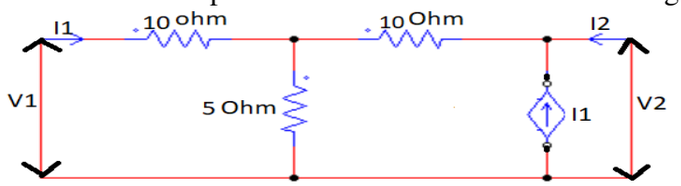
OR iii. In the circuit switch is moved from position a to b at t=0 and steady state has been reached at t=0-. Find the current i(t), using Laplace transform method. **6**

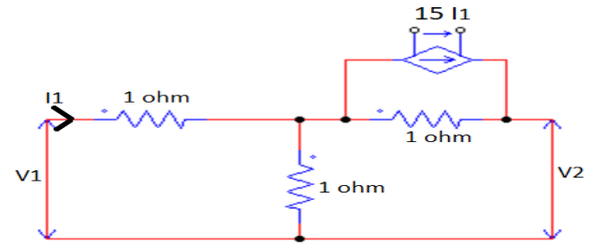


Q.6 Attempt any two:

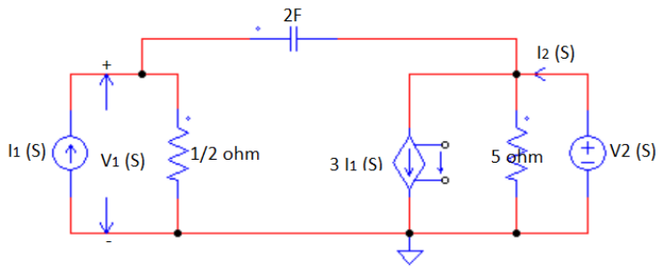
i. Determine the Z-parameter for the network shown in figure below: - **5**



ii. Find the g parameters for the given circuit? **5**



iii. Determine the h parameters of the given network: - **5**



******

Total No. of Questions: 6 *Total No. of Printed Pages:4*

Enrollment No.....

Faculty of Engineering

End Sem (Odd) Examination Dec-2019

EE3CO07 / EX3CO07 Circuit Analysis and Synthesis

Programme: B.Tech. Branch/Specialisation: EE/EX

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. A practical voltage source consists of **1**
(a) An ideal voltage source in series with an internal resistance
(b) An ideal voltage source in parallel with an internal resistance
(c) Both (a) and (b) are correct
(d) None of these

ii. The circuit consists of two resistance R_1 & R_2 in parallel. The total current passing through the circuit is IT. The current passing through R_2 is **1**
(a) IT R_1/R_1+R_2 (b) IT R_2/R_1+R_2
(c) IT $(R_1+R_2)/R_1$ (d) IT $(R_1+R_2)/R_2$

iii. Superposition theorem is not valid only for **1**
(a) Voltages responses (b) Current responses
(c) Power responses (d) All of these

iv. In a Complex impedance circuit, the maximum power transfer occurs when the load impedance is equal to **1**
(a) Source impedance
(b) Source resistance
(c) Complex conjugate of source impedance
(d) None of these

v. Transient behaviour occurs in any circuit when. **1**
(a) There are sudden changes of applied voltage
(b) The voltage source is shorted
(c) The circuit is connected or disconnected from the supply.
(d) All the above happen.

vi. The time constant of a series RC circuit is **1**
(a) 1/RC (b) R/C (c) RC (d)e-RC

vii. The Laplace transform of unit step function is **1**
(a) 1/s (b) 1 (c) 1/s2 (d) 1/s+a

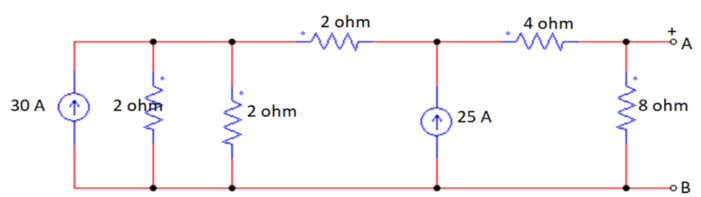
viii. Laplace transform analysis gives **1**
(a) Time domain response only (b) Frequency domain response only
(c) Both (a) and (b) (d) None of these

ix. If $Z_{11}=2\Omega$; $Z_{12}=1\Omega$; $Z_{21}=1\Omega$ and $Z_{22}=3\Omega$, what is the determinant of admittance matrix. **1**
(a) 5 (b) 1/5 (c) 1 (d) 0

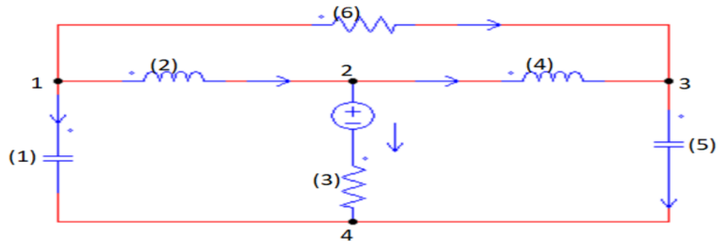
x. The number of possible combinations generated by four variables taken two at a time in a two-port network is **1**
(a) Four (b) Two (c) Six (d) Eight

Q.2 i. Explain independent ideal and practical sources with their characteristics. **4**

ii. Find the terminal voltage across a & b (Vab) in the figure shown below using source transformer techniques. **6**

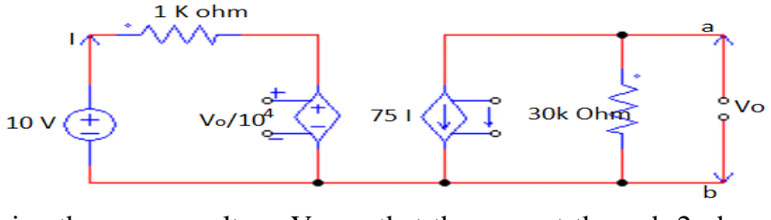


OR iii. Draw the graph for the network shown in figure below & determine the number of possible trees. **6**

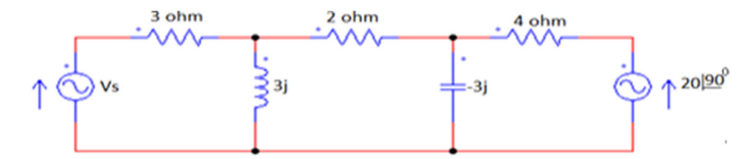


Q.3 i. Derive the necessary condition to transfer the maximum power from source to load. **4**

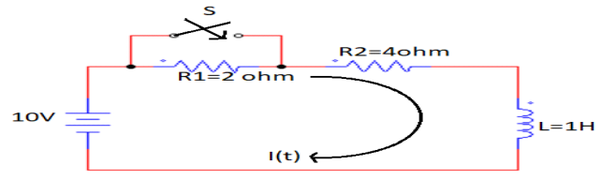
ii. Replace the circuit in the figure with Norton's equivalent circuit across terminals a & b. **6**



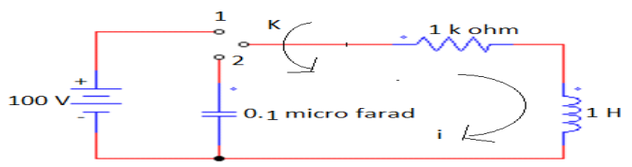
OR iii. Determine the source voltage Vs, so that the current through 2-ohm resistor is zero by superposition theorem. **6**



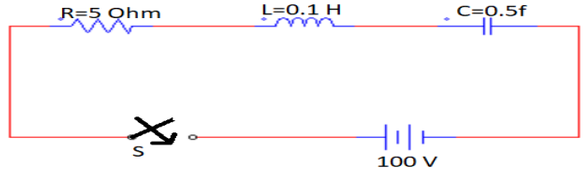
Q.4 i. Find i (0+) if switch is closed at t=0 and steady state is reached with switched open. Draw circuit at t=0+ **4**



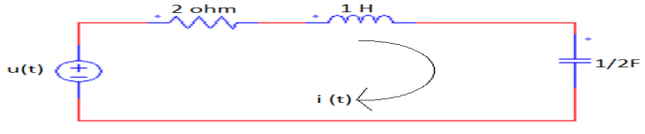
ii. In the given circuit, the switch K is moved from position 1 to 2 at t=0, obtain the values of I, di/dt and d2i/dt2 at t **6**



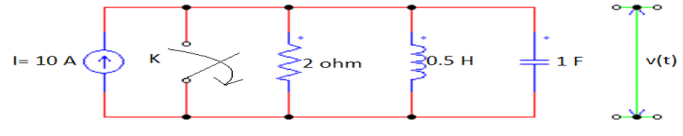
OR iii. Write down the KVL equation for final position of Switch (close). Draw the circuit at t=0+ if switch is closed at t=0 and then find i(0+), $\frac{di}{dt}$ (0+), $\frac{di2}{dt2}$ (o +) **6**



Q.5 i. Find the current i(t) in the circuit shown in fig below, using Laplace transform method. **4**



ii. Find the expression for the voltage v(t), if switch is opened at t=0, using Laplace transform method. **6**



Marking Scheme

EE3CO07 / EX3CO07 Circuit Analysis and Synthesis

Q.1	i.	A practical voltage source consists of (a) An ideal voltage source in series with an internal resistance		**1**
	ii.	The circuit consists of two resistance R_1 & R_2 in parallel. The total current passing through the circuit is IT. The current passing through R_2 is (a) IT R_1/R_1+R_2		**1**
	iii.	Superposition theorem is not valid only for (c) Power responses		**1**
	iv.	In a Complex impedance circuit, the maximum power transfer occurs when the load impedance is equal to (c) Complex conjugate of source impedance		**1**
	v.	Transient behaviour occurs in any circuit when. (d) All the above happen.		**1**
	vi.	The time constant of a series RC circuit is (c) RC		**1**
	vii.	The Laplace transform of unit step function is (a) 1/s		**1**
	viii.	Laplace transform analysis gives (b) Frequency domain response only		**1**
	ix.	If $Z_{11}=2\Omega$; $Z_{12}=1\Omega$; $Z_{21}= 1\Omega$ and $Z_{22}= 3\Omega$, what is the determinant of admittance matrix. (c) 1		**1**
	x.	The number of possible combinations generated by four variables taken two at a time in a two-port network is (c) Six		**1**
Q.2	i.	Independent ideal sources with their characteristics Practical sources with their characteristics	2 marks 2 marks	**4**
	ii.	Find the terminal voltage across a & b (Vab) in the figure shown below using source transformer techniques. Step marking Result	 4 marks 2 marks	**6**
OR	iii.	Draw the graph Matrix Number of possible trees	2 marks 2 marks 2 marks	**6**
Q.3	i.	Derivation Necessary condition	2 marks 2 marks	**4**
	ii.	Replace the circuit in the figure with Norton's equivalent circuit across terminals a & b. Isc = -0.75 Amp Rth = 38.7 Kohm Norton's equivalent circuit	 2 marks 2 marks 2 marks	**6**
OR	iii.	Determine the source voltage Vs, so that the current through 2-ohm resistor is zero by superposition theorem. I across 2 ohm = 0 Vs = 16.97 < - 8.13 Volt	 3 marks 3 marks	**6**
Q.4	i.	i (0-) = 10/6 Amp i (0+) = 10/6 Amp Circuit at t=0+	1 mark 1 mark 2 marks	**4**
	ii.	Values of I, Value of di/dt Value of d2i/dt2 at t	2 marks 2 marks 2 marks	**6**
OR	iii.	i(0+) $\frac{di}{dt}$ (0+) $\frac{di2}{dt2}$ $(o+)$	2 marks 2 marks 2 marks	**6**
Q.5	i.	Current i(t) Current i(s)	2 marks 2 marks	**4**
	ii.	Expression for the voltage v(t), if switch is opened at t=0, using Laplace transform method. Stepwise marking		**6**
OR	iii.	Find the current i(t), using Laplace transform method. Current i(t) Current i(s)	 3 marks 3 marks	**6**
Q.6		Attempt any two:		
	i.	Determine the Z-parameter for the network shown in figure below Z_{11} = 20 ohm Z_{12} = 5 ohm Z_{21} = 20 ohm Z_{22} = 15 ohm Solution	 1 mark 1 mark 1 mark 1 mark 1 mark	**5**
	ii.	Find the g parameters for the given circuit g_{11} = 1/2 ohm g_{12} = - 1/2 ohm	 1 mark 1 mark	**5**

	g_{21} = 3 ohm	1 mark	
	g_{22} = -1 ohm	1 mark	
	Solution	1 mark	
iii.	Determine the h parameters of the given network		**5**
	h_{11} = 1/2 (s+1)	1 mark	
	h_{12} = s / (s+1)	1 mark	
	h_{21} = 2s + 3/s + 1\	1 mark	
	h_{22} = 11s+1/5(s+1)	1 mark	
	Solution	1 mark	

******