

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III (NEW) EXAMINATION – WINTER 2017

Subject Code: 2130901

Date: 14/11/2017

Subject Name: Circuits and Networks

Time: 10:30 AM to 01:00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
Q.1	(a) Explain principle of source transformation to obtain equivalent current source from a voltage source.	03
	(b) Draw the dual of network shown in figure 1	04
	(c) Find the value of all currents and voltage across 5Ω resistor for the network shown in figure 2 using mesh analysis.	07
Q.2	(a) State and explain maximum power transfer theorem.	03
	(b) Explain characteristic of an ideal current source.	04
	(c) Apply nodal analysis for the network shown in figure 3 and find current across 2Ω resistor connected between two nodes.	07
	OR	
	(c) Find voltage V_X in the network shown in figure 4 using superposition theorem.	07
Q.3	(a) State and explain Millman's theorem.	03
	(b) What is impulse function? Find the impulse response for the network function $H(S)=5/(S^2+S+1)$	04
	(c) Find Thevenin's equivalent circuit for the network shown in figure 5. Also find power dissipated in R_L .	07
	OR	
Q.3	(a) State and explain Superposition theorem.	03
	(b) In the network shown in figure 6, switch k is moved from position a to position b at $t=0$. Find current $i(t)$ using Laplace transformation method.	04
	(c) Find Norton's equivalent circuit for the network shown in figure 7. Obtain current through 5Ω resistor.	07
Q.4	(a) State and explain initial value theorem.	03
	(b) In the network shown in figure 8, find i_1 , i_2 , di_1/dt and di_2/dt at $t=0^+$ assuming all initial conditions as zero.	04
	(c) A series RLC circuit having with zero inductor current and zero capacitor voltage is excited by 20 V dc source. Find $i(0^+)$ and $di/dt(0^+)$. Take $R=10\Omega$, $C=10\mu F$, $L=2H$. (A switch K is also connected in series with RLC.)	07
	OR	
Q.4	(a) Explain network synthesis.	03
	(b) Give relationship between y parameters and h parameters.	04
	(c) In the network shown in figure 9, switch K is moved from a to b at $t=0$, steady state having previously been attained. Determine current $i(t)$.	07
Q.5	(a) Explain the following terms	03

1. Planar graph

2. Tree

3. Co-tree
- (b)

A graph of a network is shown in figure 10. Obtain Tie-set matrix from the graph. You are not allowed to change the directions of elements, its numbering and numbering of nodes. Elements of tree are shown as solid lines. Links are shown as dotted lines.

04
- (c)

Find Z-parameters for the network shown in figure 11.

07
- OR
- Q.5

(a)

Obtain incidence matrix for the graph shown in previous question i.e. Q-5(b)

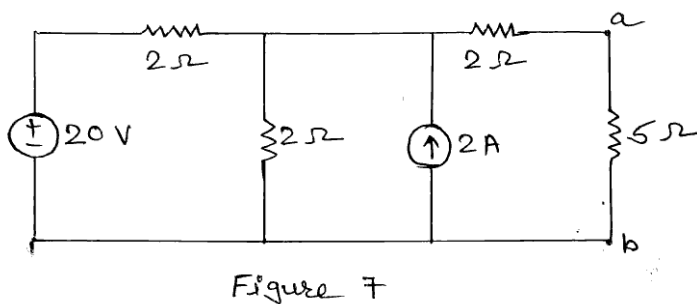
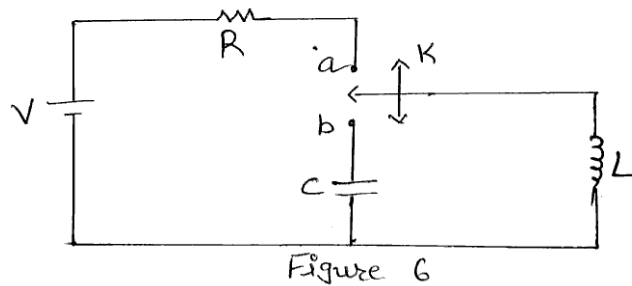
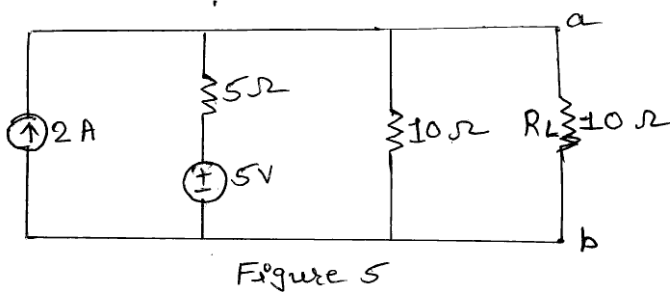
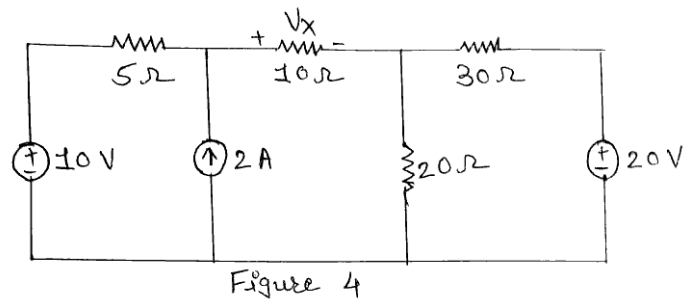
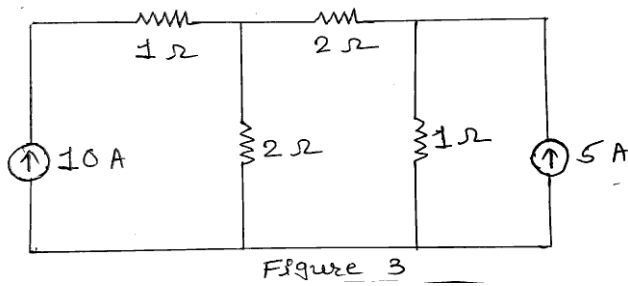
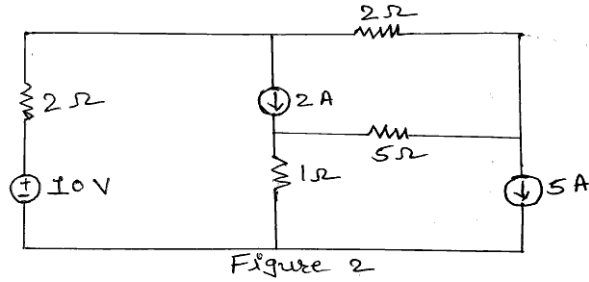
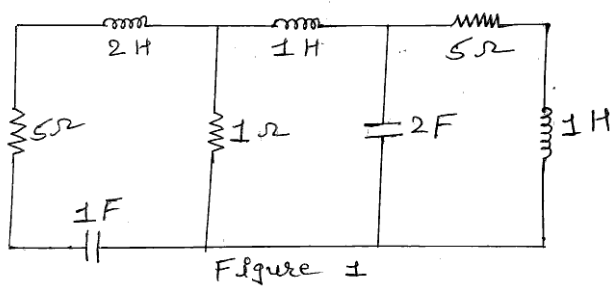
03
- (b)

Obtain fundamental cut-set matrix for the graph shown in previous question i.e. Q-5(b)

04
- (c)

Obtain ABCD parameters for the network shown in figure 12.

07



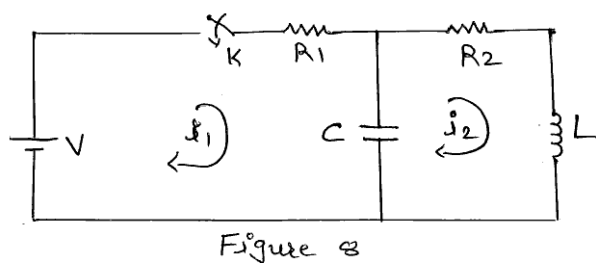


Figure 8

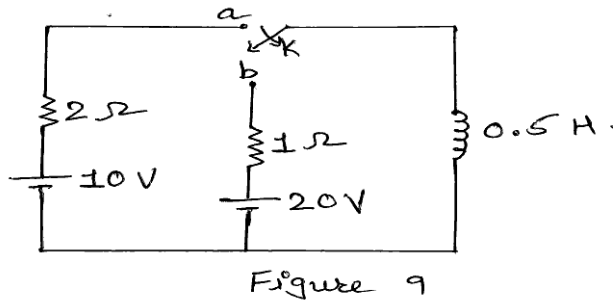


Figure 9

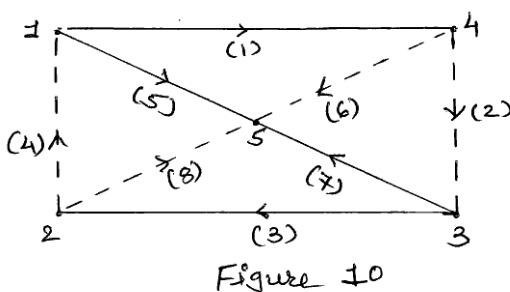


Figure 10

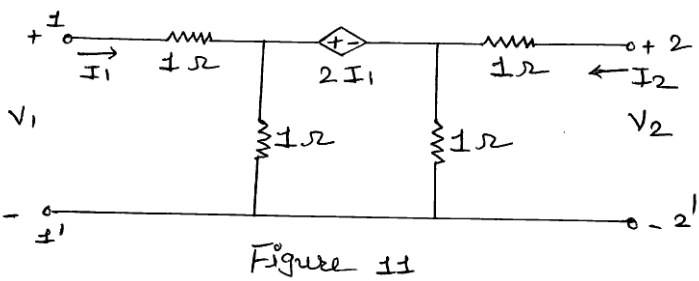


Figure 11

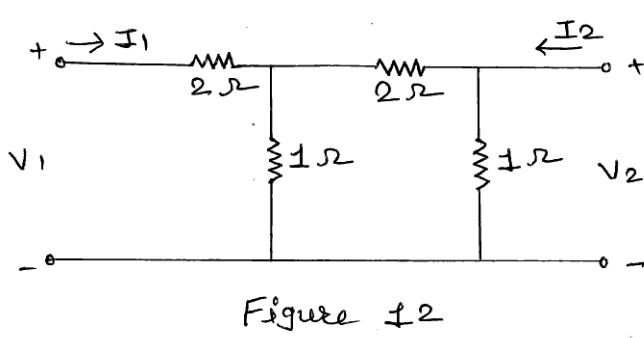


Figure 12