

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III (New) EXAMINATION – WINTER 2018

Subject Code:2130901

Date:28/11/2018

Subject Name:Circuits and Networks

Time:10:30 AM TO 01:00 PM

Total Marks: 70

Instructions:

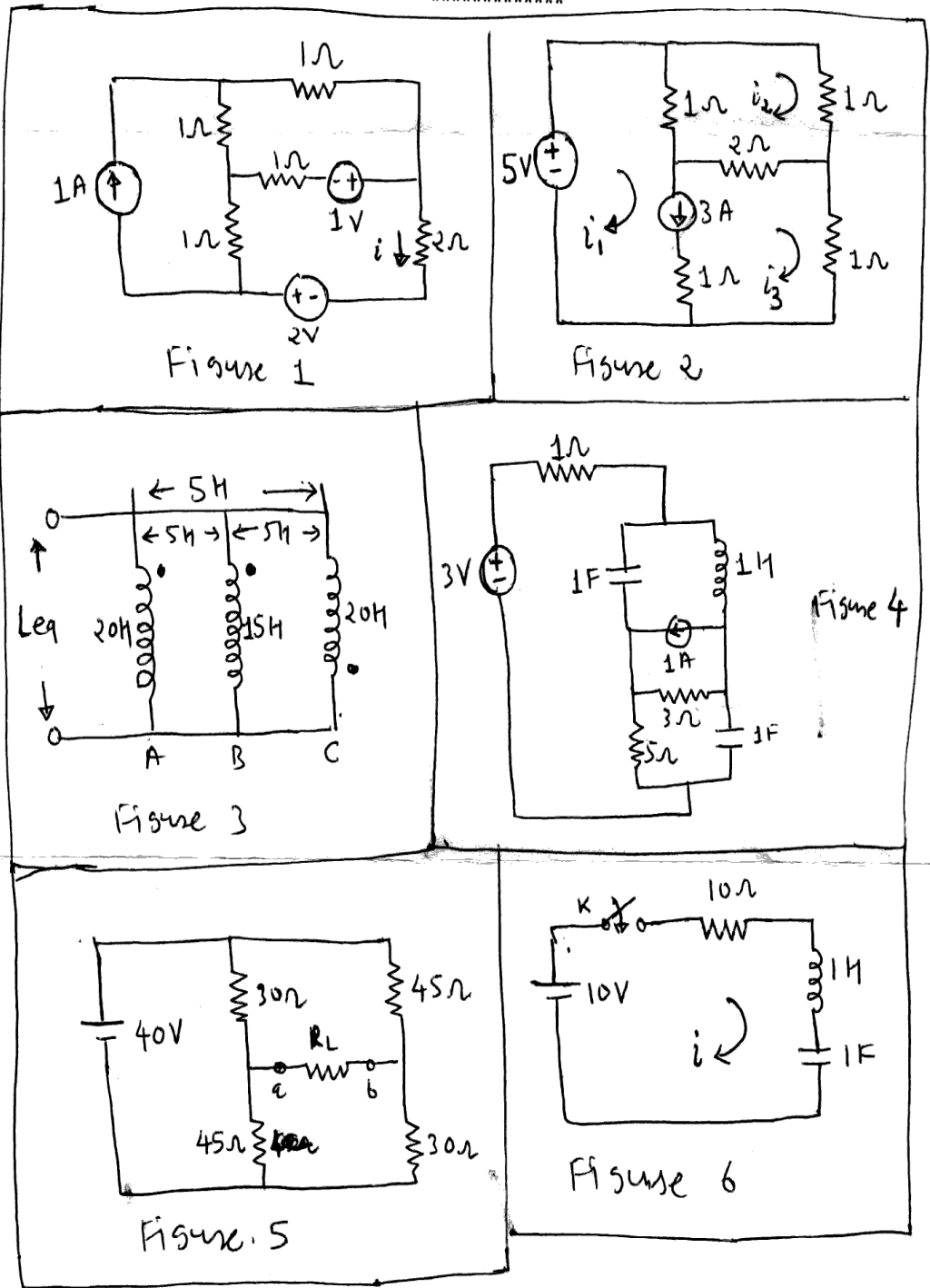
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
Q.1	(a) Define: Unilateral and bilateral network, Active and passive network.	03
	(b) For the network shown in figure 1, all the sources are time invariant. Find branch current i using source transformation.	04
	(c) For the network shown in figure 2, find out unknown mesh currents using mesh analysis.	07
Q.2	(a) Determine the equivalent inductance between the terminals of a three coil as shown in figure 3.	03
	(b) Draw the dual network of the network given in figure 4.	04
	(c) State and explain Thevenin's theorem. For the network shown in figure 5, find out V_{TH} and R_{TH} across point a-b (R_L).	07
	OR	
	(c) State and explain Norton's theorem. For the network shown in figure 5, find out I_N and R_N across point a-b (R_L).	07
Q.3	(a) List the advantages of Laplace transformation over classical method.	03
	(b) For the network shown in figure 6, switch 'k' is closed at $t=0$ with capacitor uncharged and zero current in the inductor. Find i , di/dt and d^2i/dt^2 at time $t=0^+$.	04
	(c) For the network shown in figure 7, switch 'k' is opened at time $t=0$. Find $V_2(t)$ for $t \geq 0$.	07
	OR	
Q.3	(a) State and explain initial value theorem.	03
	(b) Explain the behavior of inductor and capacitor at time $t = 0$ and $t = \infty$. Also draw its equivalent circuit in both cases.	04
	(c) An exponential voltage $v(t) = 10e^{-5t}$ is applied at time $t=0$ to a R-L series circuit shown in figure 8. Obtain particular solution for the current $i(t)$ for $t \geq 0$.	07
Q.4	(a) Derive y- parameters in terms of z-parameters.	03
	(b) In the network shown in figure 9, switch 'k' is opened at time $t=0$. Find $v(t)$, $t \geq 0$. Assume zero capacitor voltage and zero inductor current before switching (Solve through Laplace transformation).	04
	(c) For the network shown in figure 10, find out ABCD parameters.	07
	OR	
Q.4	(a) Derive z- parameters in terms of y-parameters.	03
	(b) In the network shown in figure 11, switch 'k' is opened at time $t = 0$. Steady state conditions is achieved before $t=0$. Find current $i(t)$ for $t \geq 0$ (Solve through Laplace transformation).	04
	(c) For the network shown in figure 10, find out h- parameters.	07
Q.5	(a) Define planar graph, tree and co-tree.	03
	(b) List the necessary and sufficient conditions for positive real functions.	04

- (c) For the network shown in figure 12, draw the oriented graph and write incidence matrix, f-cut set matrix and tie-set matrix. 07

OR

- Q.5 (a) Define fundamental loop and cut-set. 03
(b) List properties of positive real functions. 04
(c) For the network shown in figure 13, draw the oriented graph and write incidence matrix, f-cut set matrix and tie-set matrix. 07



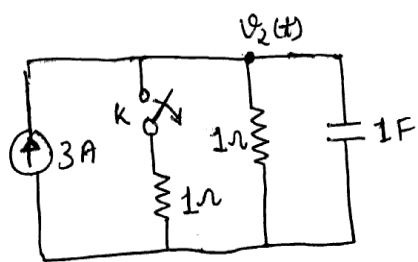


Figure. 7

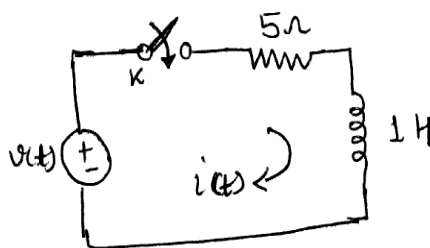
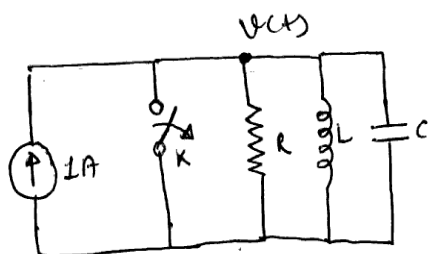


Figure 8



$R=1\Omega, L=1H, C=1F$

Figure 9

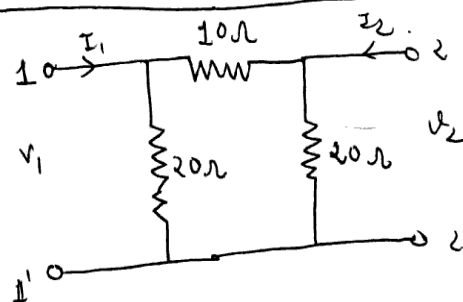


Figure 10

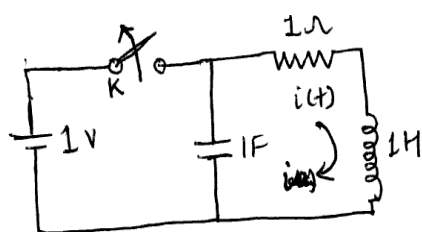


Figure 11

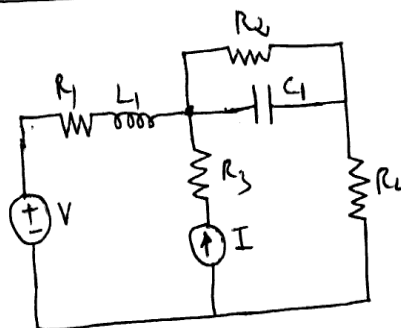
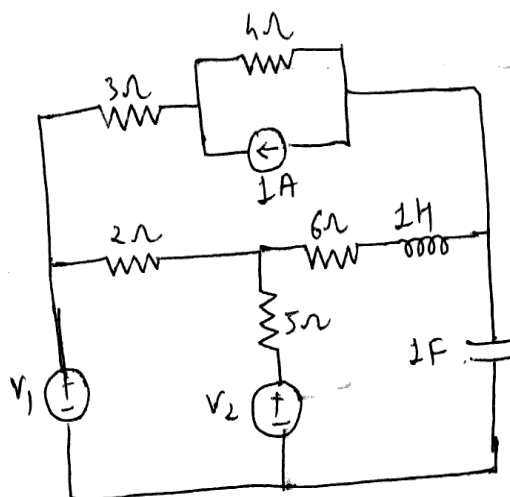


Figure 12



← Figure 13