

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III (NEW) EXAMINATION – SUMMER 2019

Subject Code: 2130901

Date: 04/06/2019

Subject Name: Circuits and Networks

Time: 02:30 PM TO 05:00 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) Mention the relations between voltage and current for the following passive elements. (1) Resistor (2) Capacitor.	03
	(b) Define following terms: (a) Linear and Nonlinear Networks (b) Active and Passive Networks	04
	(c) In the network of figure: 1, all sources are time invariant. Determine the branch current in the 2 ohm resistor using Source Transformation method.	07
Q.2	(a) State and explain Thevenin's theorem	03
	(b) Explain characteristic of an ideal voltage source.	04
	(c) Find the value of all currents and the current in the 10Ω resistor for the network shown in figure 2 using mesh analysis.	07
	OR	
	(c) In the network of figure 3, Determine the node voltages V_1 , V_2 , & V_3 using node analysis.	07
Q.3	(a) Determine the equivalent inductance at terminals A-B for the circuit shown in figure: 4.	03
	(b) Construct the exact dual of the network of figure 5.	04
	(c) Determine the value of I_1 in the network of figure 6 using superposition theorem.	07
	OR	
Q.3	(a) State and explain maximum power transfer theorem.	03
	(b) Explain and derive the step response to R-L series circuit using Laplace Transformation method.	04
	(c) Explain the procedure to obtain sinusoidal steady state response of a circuit.	07
Q.4	(a) Write the initial conditions in the inductor and capacitor at $t = 0^+$ and $t = \infty$.	03
	(b) Explain significance of poles and zeros in network functions.	04
	(c) What is time constant? Explain time constant in terms of RL and RC circuit	07
	OR	
Q.4	(a) Determine the Laplace transform of $(t) = e^{-at} \cos \omega t$.	03
	(b) Define: (1) Oriented Graph (2) Tree (3) Tie-set (4) Incidence matrix	04
	(c) The switch K is opened at $t=0$. Find out the values of ' v '; ' dV/dt ' and ' d^2V/dt^2 ' just after switching (at time $t = 0^+$) in the circuit shown in the following figure 7.	07
Q.5	(a) State and explain initial value theorem.	03
	(b) Derive the condition for the network to be reciprocal for ABCD-parameters.	04
	(c) Find the Z parameters for the network shown in figure 8.	07
	OR	
Q.5	(a) Briefly describe Millman's theorem.	03
	(b) Determine y-parameters in terms of z-parameters.	04

(c) Derive relationship between incidence matrix (A), fundamental tie-set matrix (Bf) and fundamental cut-set matrix (Qf).

07

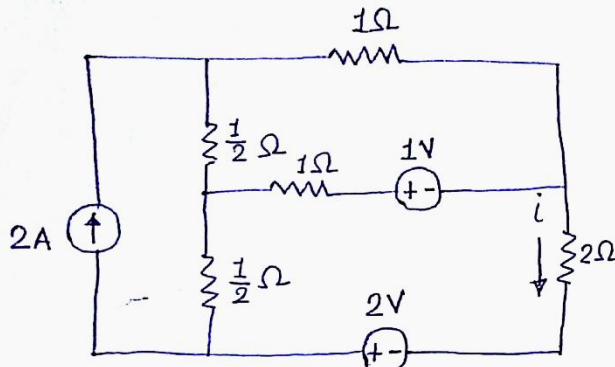


Figure - 1

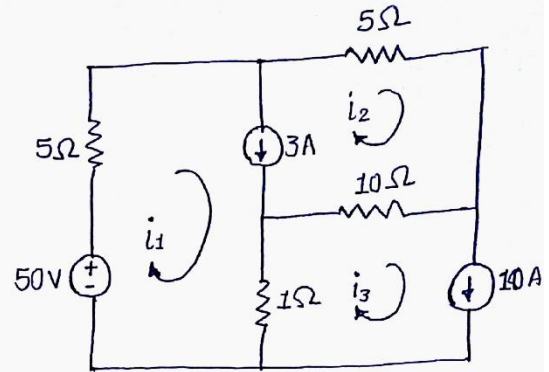


Figure - 2

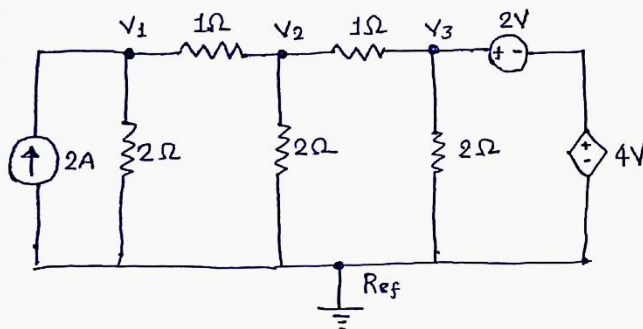


Figure - 3

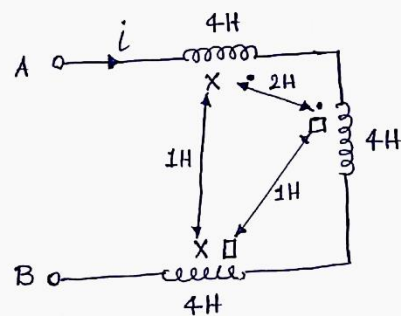


Figure - 4

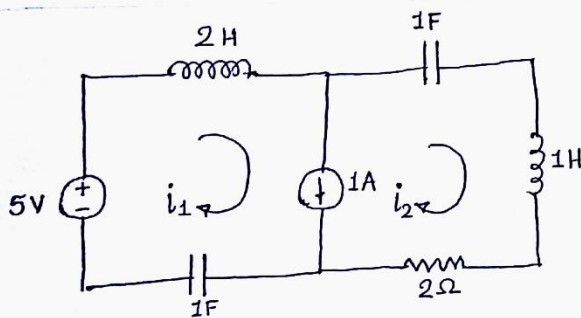


Figure - 5

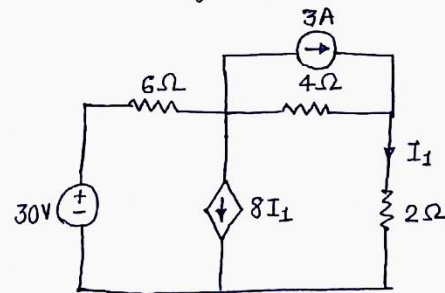


Figure - 6

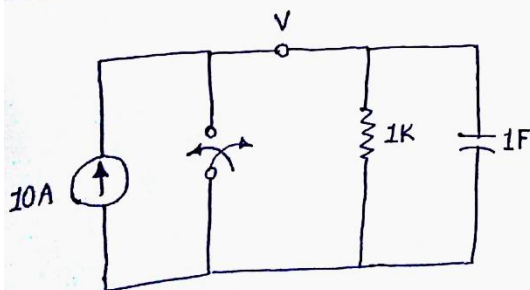


Figure - 7

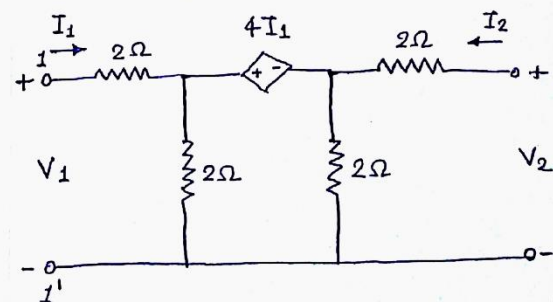


Figure - 8
