Seat No.: _____ Enrolment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– III (New) EXAMINATION – WINTER 2019

Subject Code: 3132406 **Date: 30/11/2019**

Subject Name: Circuit Theory

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)**	Define: (i) electric current (ii) 1-volt (iii) electrical power.	**03**
	(b)	What are the network elements and how it respond when electric energy supplied to it. What are the relationship between voltage and current in resister, inductor and capacitor ?	**04**
	(c)	Find the current and voltage drop through 5 Ω resistor in the network of Fig. (1) using Node voltage analysis.	**07**
Q.2	**(a)**	Define: (i) principle node (ii) branches (iii) graph.	**03**
	(b)	Using Mesh analysis, find the current flow through the 50V source in the network of Fig. (2).	**04**
	(c)	Explain maximum power transfer theorem with the help of circuit network. Derive the equation of maximum power for AC circuits. Also give the condition for maximum power transfer.	**07**
		OR	
	(c)	Explain Superposition theorem for AC Networks with the help of circuit network.	**07**
Q.3	**(a)**	Why study initial condition? Enlist the advantages which results from this understanding of initial condition.	**03**
	(b)	Find the Norton's equivalent circuit for the network given in Fig. (3). Obtain current through 5 Ω resistor.	**04**
	(c)	Find $V_{o/c}$ by nodal analysis for the given network of Fig.(4).	**07**
		OR	
Q.3	**(a)**	Mention the initial and final condition for R, L & C components in the different cases.	**03**
	(b)	Explain transmission parameters and hybrid parameters.	**04**
	(c)	Calculate the current passing through 10 Ω resistor in the network shown in Fig. (5). Use Mesh current method.	**07**
Q.4	**(a)**	Derive y- parameters in terms of z-parameters.	**03**
	(b)	Apply nodal analysis for the network shown in Fig. (6) and find current across 2 Ω resistor connected between two nodes.	**04**
	(c)	Find voltage V_x in the network as shown in Fig. (7) using Superposition Theorem.	**07**
		OR	
Q.4	**(a)**	Derive z- parameters in terms of y-parameters.	**03**
	(b)	Explain 'poles' & 'zeros' with respect to circuit theory.	**04**

(c) Illustrate the transient and steady state portion of the solution to a given network in Fig. (8) when switch moved from position "b" to "a" at t = 0. Find the expression for current. **07**

Q.5 **(a)** Discuss relationship of two port variables. **03**

(b) Discuss frequency response for parallel resonance. **04**

(c) A series RLC circuit having zero inductor current and zero capacitor voltage is excited by 20 Volt dc source. Assume R = 10 Ω, L = 2H and C = 10 uF and a switch "K" is connected in series with RLC. Find $i(0^+)$ and $di / dt\ (0^+)$. **07**

OR

Q.5 **(a)** Discuss interconnections of two port networks. **03**

(b) Discuss frequency response for series resonance. **04**

(c) In the network shown in Fig. (9), switch "K" is moved from position 'a' to 'b' at t =0, steady state having previously been attained. Determine current i(t). **07**

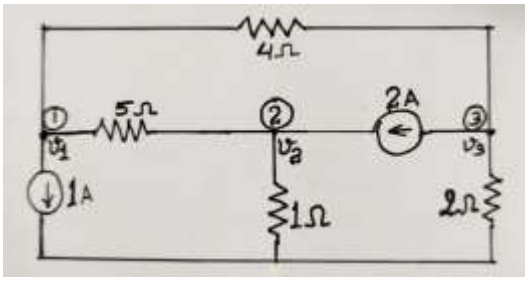

Fig. (1) Q.1 (c)

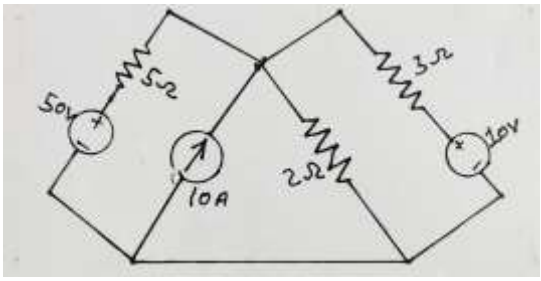

Fig. (2) Q.2 (b)

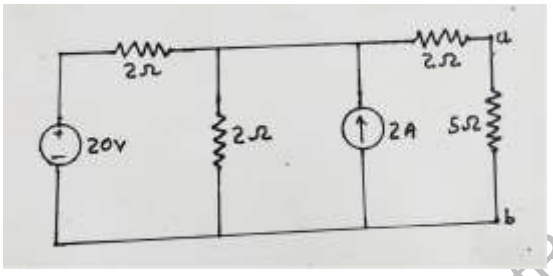

Fig. (3) Q. 3 (b)

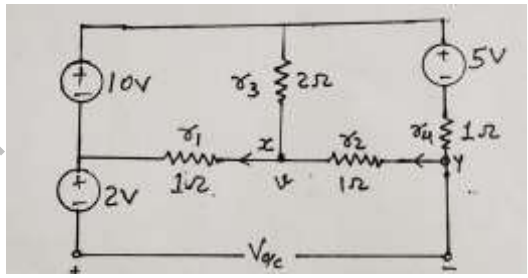

Fig. (4) Q. 3 (c)

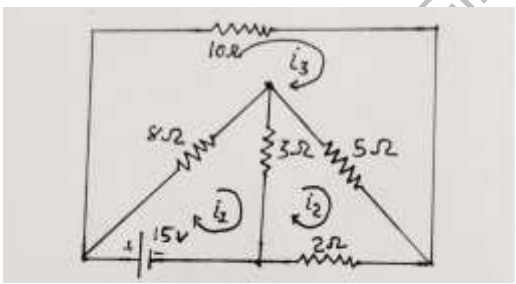

Fig. (5) OR Q. 3 (c)

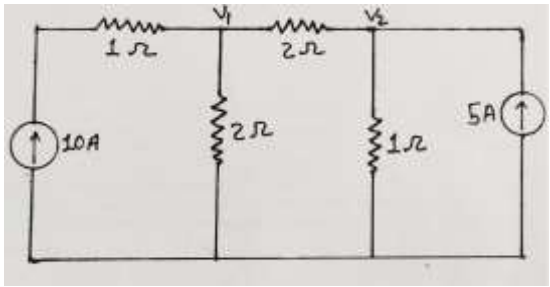

Fig. (6) Q. 4 (b)

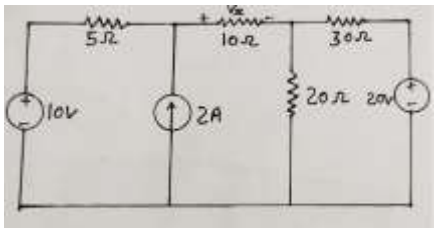

Fig. (7) Q. 4 (c)

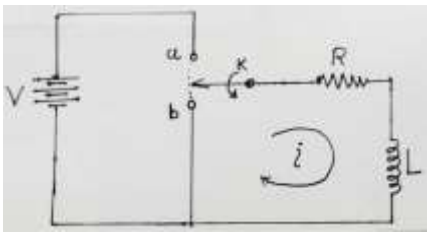

Fig. (8) OR Q. 4 (c)

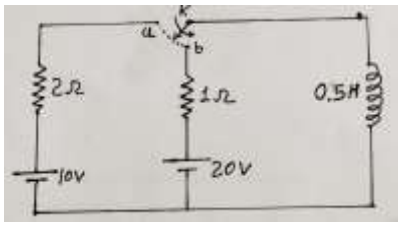

Fig (9) OR Q 5 (C)