Seat No.: _____   Enrolment No._____
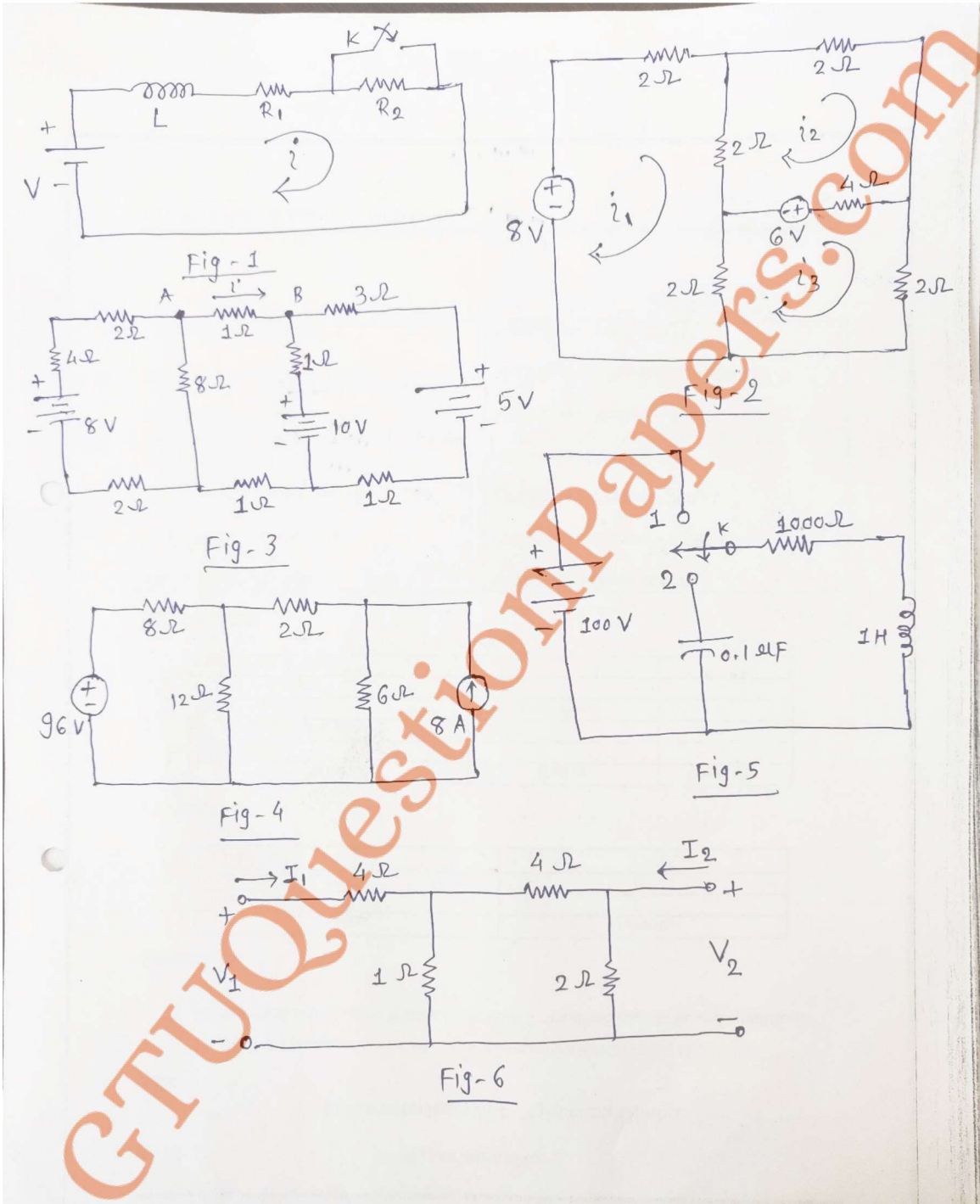
GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–III(NEW) EXAMINATION – SUMMER 2023

Subject Code:3131103   **Date:01-08-2023**
Subject Name:Network 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.
4. Simple and non-programmable scientific calculators are allowed.

			MARKS
Q.1	**(a)**	Explain Ideal and Practical Current and Voltage sources with their characteristics and differentiate them with respect to ideality and practice.	**03**
	(b)	Briefly describe active, passive, lumped and distributed elements.	**04**
	(c)	In the network of Fig-1, the switch k is closed at t=0 and the circuit was in steady state before. Determine particular solution of current i.	**07**
Q.2	**(a)**	State the possible types of controlled sources and draw their symbols.	**03**
	(b)	Define: Tree, Connected Graph, Co-tree, Sub-graph.	**04**
	(c)	Determine current through 4 Ω resistor using mesh analysis for network of Fig-2.	**07**
		OR	
	(c)	State and explain maximum power transfer theorem with necessary derivation.	**07**
Q.3	**(a)**	Explain Initial and final conditions of R, L and C elements.	**03**
	(b)	Discuss rules for source transformation.	**04**
	(c)	For the network of Fig-3, obtain current through 1 Ω resistor using Thevenin's theorem.	**07**
		OR	
Q.3	**(a)**	Define time constant and state its importance in circuit analysis.	**03**
	(b)	State and explain Norton's theorem with an example.	**04**
	(c)	Determine voltage across 6Ω resistor of Fig-4 using node analysis.	**07**
Q.4	**(a)**	Explain dot convention for coupled coils with suitable example.	**03**
	(b)	Give statements for Reciprocity Theorem and Superposition Theorem.	**04**
	(c)	Find values of $i, \dfrac{di}{dt}, \dfrac{d^2i}{dt^2}$ at t=0+ . for the network of Fig-5, if switch k is changed from position 1 to 2 at t=0.	**07**
		OR	
Q.4	**(a)**	Derive ABCD parameters in terms of z-parameters.	**03**
	(b)	Determine h-parameters in terms of y-parameters.	**04**
	(c)	Derive relationship between incidence matrix, fundamental tie-set matrix and fundamental cut-set matrix.	**07**
Q.5	**(a)**	Define: oriented graph, node, tie-set matrix.	**03**
	(b)	Determine h-parameters in terms of z-parameters.	**04**
	(c)	Determine h parameters for network of Fig-6	**07**
		OR	

Q.5 **(a)** Define: Incident Matrix, cut-set, graph. 03
(b) Briefly explain PRF. 04
(c) Derive the condition for the network to be symmetrical for g-parameters. 07

Fig - 1

Fig - 2

Fig - 3

Fig - 4

Fig - 5

Fig - 6

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