

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III(NEW) EXAMINATION – SUMMER 2023****Subject Code:3132406****Date:28-07-2023****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.
4. Simple and non-programmable scientific calculators are allowed.

		Marks
Q.1	(a) Define: (i) electric current (ii) electrical power (iii) electrical energy.	03
	(b) What are the network elements and how it respond when electric energy supplied? Write the relationship between voltage and current in resister, inductor and capacitor.	04
	(c) Discuss concept of duality and dual networks.	07
Q.2	(a) Define with respect to electric circuit & network: (i) Node (ii) Tree (iii) Branch.	03
	(b) State and explain Kirchhoff's law.	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) Write and explain Norton Theorem.	04
	(c) Write short notes on poles and zeros of network functions.	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) Discuss star-delta and delta-star connections & its conversion.	07
Q.4	(a) Derive y- parameters in terms of z-parameters.	03
	(b) Apply nodal analysis for the network shown in Fig. (1) And find current across $2\ \Omega$ resistor connected between two nodes.	04
	(c) List the steps for analysis of network using Laplace Transformation Method.	07
	OR	
Q.4	(a) Derive z- parameters in terms of y-parameters.	03
	(b) Compare node voltage analysis with loop variable analysis.	04
	(c) Illustrate the transient and steady state portion of the solution to a given network in Fig. (2) 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 $R = 10\ \Omega$, $L = 2H$ and $C = 10\ \mu F$ 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) Discuss steady and transient response of electrical network. 07

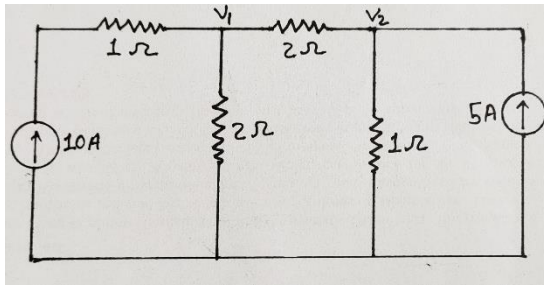


Fig. (1) Q. 4 (b)

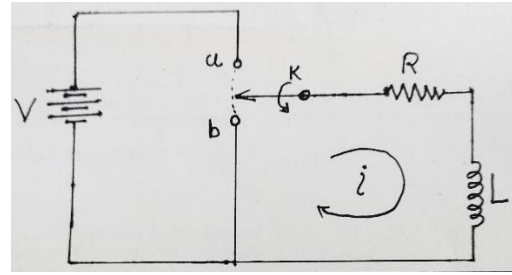


Fig. (2) OR Q. 4 (c)

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