Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (NEW) EXAMINATION – WINTER 2023

Subject Code:3130906 Date:16-01-2024

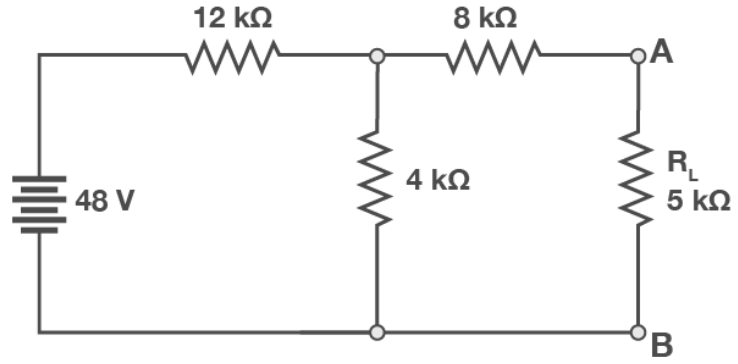
Subject Name:Electrical Circuit Analysis

Time:10:30 AM TO 01:00 PM Total Marks:70

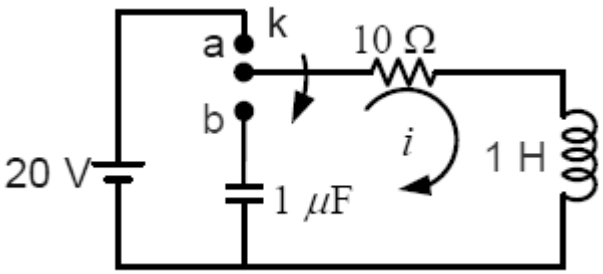
Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	Explain Norton's theorem.	**03**
	(b)	Develop Step by step solution to solve electrical networks by using Superposition Theorem.	**04**
	(c)	Determine the load current of figure 1 given below using Thevenin's Theorem.	**07**

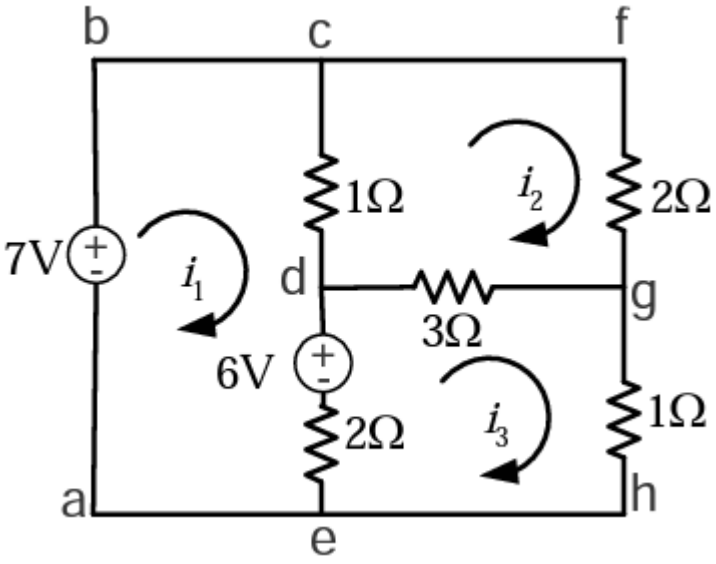


Q.2	**(a)**	Explain in brief about the ideal transformer.	**03**
	(b)	Derive the step response to R-L series circuit using Laplace Transformation method.	**04**
	(c)	For the circuit shown in Figure 2 switch K is changed from position a to b at t=0, steady state condition having been reached before switching. Find the values of i; di/dt, d^2i/dt^2 at $t = 0^+$.	**07**

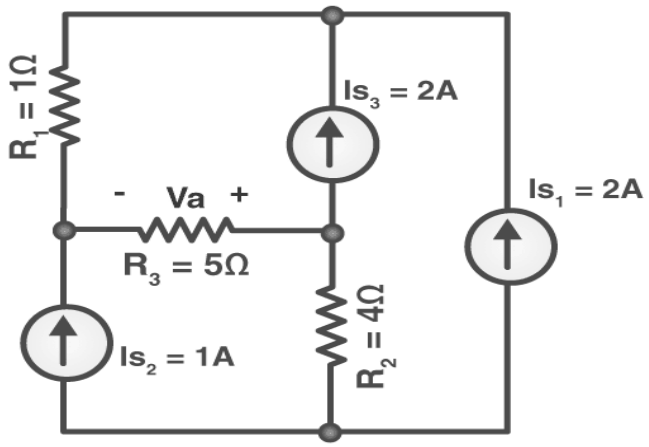


OR

	(c)	In the circuit shown in Figure 3 determine the mesh currents i_1, i_2, i_3	**07**



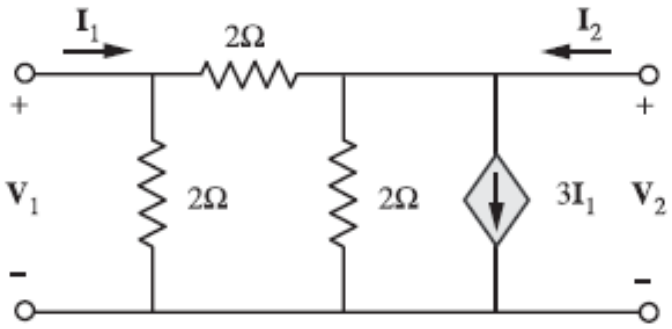
Q.3	**(a)**	Explain the initial condition in different passive electrical elements. What is the importance of initial conditions in network analysis?	**03**
	(b)	Discuss why. (i) The current in inductor cannot change instantaneously. (ii) The voltage across a capacitor cannot change instantaneously.	**04**
	(c)	Prove Initial and Final Value theorems.	**07**
		OR	
Q.3	**(a)**	Explain the importance of Dot convention in coupled circuit with suitable example.	**03**
	(b)	What are the properties of Laplace transformation? Explain in detail.	**04**
	(c)	What is time constant? What is its significance? Illustrate through an example.	**07**
Q.4	**(a)**	Specify the term (i) RMS values (ii) Apparent power (iii) Complex power.	**03**
	(b)	Convert the capacitance C (passive element) to Laplace domain using Laplace transformation.	**04**
	(c)	Define poles and zeros of network function. Explain significance of poles and zeros in different network functions.	**07**
		OR	
Q.4	**(a)**	Explain characteristics of unit ramp function.	**03**
	(b)	Explain time constant in case of series R-L and series R-C circuit.	**04**
	(c)	Find the value of voltage across R3 resistance of figure 4 using Nodal Analysis.	**07**



Q.5	**(a)**	What is the condition of symmetry of all different two port parameters?	**03**
	(b)	Generalize relationship of h-parameters to y-parameters.	**04**
	(c)	Obtain ABCD parameters in terms of Z-parameters for a two-port network.	**07**

OR

Q.5	**(a)**	Define H-parameter of a two-port network.	**03**
	(b)	Find out reciprocity condition for h-Parameters.	**04**
	(c)	Determine Y-parameters of the circuit shown in figure 5.	**07**



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