GUJARAT TECHNOLOGICAL UNIVERSITY
BE- SEMESTER–III (NEW) EXAMINATION – WINTER 2024

Subject Code: 3130906   **Date: 26-11-2024**
**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)	State and explain Superposition theorem.	**04**
	(c)	Determine the load current of Figure 1 using Thevenin's Theorem.	**07**
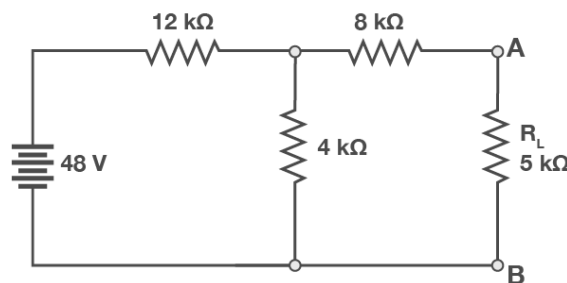
Q.2	**(a)**	Explain the initial condition in different passive electrical elements. What is the importance of initial conditions in network analysis?	**03**
	(b)	Formulate the step response of an R-L series circuit using the Laplace Transform method.	**04**
	(c)	Explain in detail about transient response in series R-C circuit having DC excitation.	**07**

OR

	(c)	State and explain Maximum power transfer theorem with suitable example.	**07**

Q.3	**(a)**	Explain the importance of Dot convention in coupled circuit with suitable example.	**03**
	(b)	Discuss why.	**04**
		(i) The current in inductor cannot change instantaneously.	
		(ii) The voltage across a capacitor cannot change instantaneously.	
	(c)	Provide a detailed explanation of an ideal transformer.	**07**

OR

Q.3	**(a)**	In terms of two terminal elements, define: 1) Unilateral elements, 2) Passive elements, 3) Time-variant elements.	**03**

(b)	Define unit parabola function. Obtain Laplace transform of unit parabola function.	**04**
(c)	Define poles and zeros of network function. Explain significance of poles and zeros in different network functions.	**07**

Q.4	**(a)**	Obtain Laplace of Hyperbolic sine and cosine functions.	**03**
	(b)	Derive expression of Y parameters in terms of Z parameters.	**04**
	(c)	Prove Initial and Final Value theorems.	**07**

OR

Q.4	**(a)**	Specify the term (i) RMS values (ii) Apparent power (iii) Complex power.	**03**
	(b)	What is the condition of symmetry of all different two port parameters?	**04**
	(c)	State the Advantages of Laplace transform method over classical method.	**07**

Q.5	**(a)**	Show that h parameters will not exit for a two port network where $Z_{22}=0$.	**03**
	(b)	Describe the solution of non-homogeneous differential equation for particular integral.	**04**
	(c)	Draw an equivalent circuit of a two port network in terms of (i) admittance parameters (ii) h- parameters.	**07**

OR

Q.5	**(a)**	Find out reciprocity condition for h-Parameters.	**03**
	(b)	Explain characteristic of an ideal voltage source.	**04**
	(c)	Evaluate Step by step solution to solve with suitable examples for electrical networks by using Thevenin's Theorem.	**07**

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