Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (NEW) EXAMINATION – SUMMER 2024

Subject Code:3130906 Date:19-07-2024

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)**	State and explain Superposition theorem.	**03**
	(b)	Explain Norton's theorem.	**04**
	(c)	Find the value of load resistance when maximum power is transferred across it and also find the value of maximum power transferred for the network of the circuit shown in Figure 1.	**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)	State and explain Maximum power transfer theorem with suitable example.	**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)	Explain in detail about transient response in series R-C circuit having DC excitation.	**07**
Q.3	**(a)**	What is time constant? What is its significance?	**03**
	(b)	Explain the importance of Dot convention in coupled circuit with suitable example.	**04**
	(c)	Explain and derive the step response to R-L series circuit using Laplace Transformation method.	**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 ramp function. Obtain Laplace transform of unit ramp function.	**04**
	(c)	Find the value of voltage across R3 resistance of figure 3 using Nodal Analysis.	**07**
Q.4	**(a)**	Define H-parameter of a two-port network.	**03**
	(b)	Derive expression of Y parameters in terms of Z parameters.	**04**
	(c)	Find z parameters of the network shown in figure 4.	**07**
		OR	

Q.4	**(a)**	What is the condition of symmetry of all different two port parameters?	**03**
	(b)	Define the term Poles and Zeros with suitable example.	**04**
	(c)	Determine Y-parameters of the circuit shown in figure 5.	**07**
Q.5	**(a)**	Define unit ramp function. Obtain Laplace transform of unit ramp function.	**03**
	(b)	Describe the solution of non-homogeneous differential equation for particular integral.	**04**
	(c)	Define poles and zeros of network function. Explain significance of poles and zeros in different network functions.	**07**

OR

Q.5	**(a)**	Draw and explain the dependent controlled sources.	**03**
	(b)	Explain characteristic of an ideal voltage source.	**04**
	(c)	State the procedure to obtain solution of a network using Laplace transform method. State advantage of Laplace method over a classical method.	**07**

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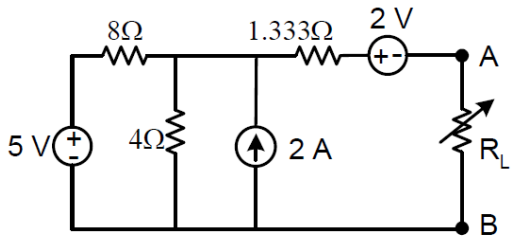

Figure.1

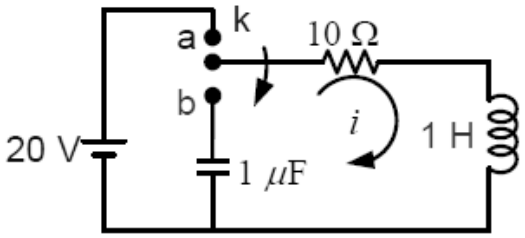

Figure.2

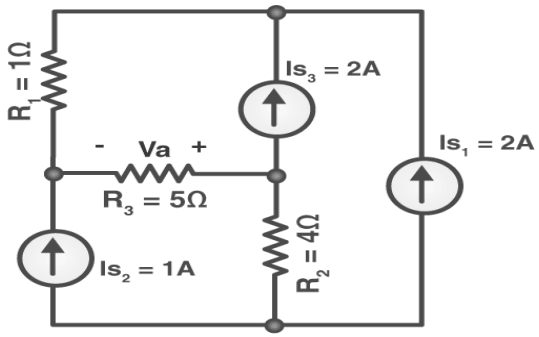

Figure.3

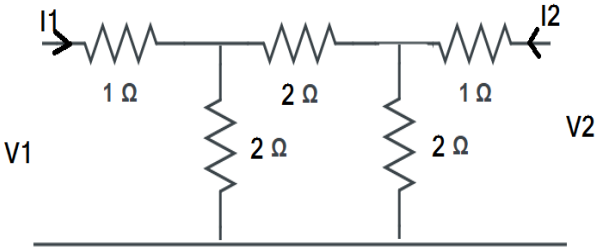

Figure.4

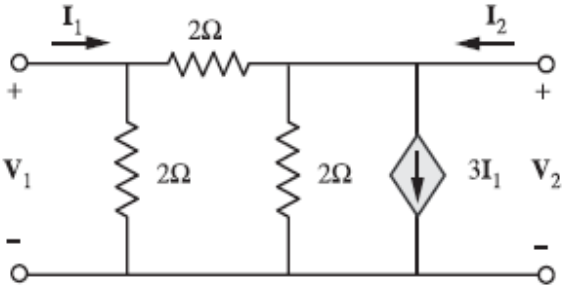

Figure.5