Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER– III EXAMINATION – SUMMER 2026

Subject Code:3130906 Date:17-06-2026

Subject Name:Electrical Circuit Analysis

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)**	State Thevenin and Norton theorem.	**03**
	(b)	Discuss short-circuit admittance parameters and draw equivalent circuit for short circuit admittance parameters.	**04**
	(c)	In the network shown in fig.1, contains two voltage sources V_1 and V_2. With $V_1=30\angle 0^0$ V, Calculate V_2 such that the current in the 2+j3 Ω impedance is zero.	**07**
Q.2	**(a)**	In the circuit shown in fig.2, a dc voltage suddenly applied to a series circuit. The inductor and capacitor are initially uncharged. Determine the particular solution for current i(t) in the circuit.	**03**
	(b)	Describe maximum power transfer theorem and write different conditions for maximum power transfer theorem for AC circuits.	**04**
	(c)	Explain Superposition theorem with suitable example.	**07**
		OR	
	(c)	Explain Reciprocity theorem with suitable example.	**07**
Q.3	**(a)**	Elaborate series-paralle1 connection for two-port network.	**03**
	(b)	Define Kirchhoff Voltage Law and Kirchhoff Current Law with suitable example.	**04**
	(c)	In the network shown in fig.3, a steady state is reached with the switch k open. At time t=0. Switch k is closed. For the element values given, Figure out the values $V_a(0-)$ and $V_a(0+)$.	**07**
		OR	
Q.3	**(a)**	Explain parallel-parallel connection for two-port network.	**03**
	(b)	List difference between ideal and practical voltage source and Describe about source transformation.	**04**
	(c)	In the network shown in fig.4, the switch k is moved from position 1 to 2 at t=0 a steady state having previously been attained. Find out $d^2i/dt^2(0+)$ at t=0+.	**07**
Q.4	**(a)**	Explore the dual of the network shown in Fig.5.	**03**
	(b)	In the network shown in fig.6, a steady state is reached with the switch k open. At t=0 the switch k is closed, Compute i(t) for the numerical values given.	**04**
	(c)	In the network of fig.7, the switch k is opened at time t=0. Evaluate the particular solution for voltage v(t) across the parallel circuit using Laplace transformation. Assume that there is no charge across the capacitor C and no current in the inductor L before switching.	**07**
		OR	
Q.4	**(a)**	In the two mesh network shown in fig.8, Identify the mesh currents I_1 and I_2.	**03**
	(b)	In the network shown in fig.9, the network attains a steady state, and at t=0, the switch is closed. Calculate $V_a(t)$ for $t\geq 0$.	**04**

	(c)	In a series R-L-C circuit, R=5Ω, L=1H and C=0.25 F and v(t) = $8e^{-2t}$ Volts. Switch k is closed at time t=0. Evaluate particular solution for the current using Laplace transform method. Assume zero initial conditions in the elements.	**07**
Q.5	**(a)**	Find out reciprocity condition for g-Parameters.	**03**
	(b)	Generalize relationship of h-parameter to z-parameters.	**04**
	(c)	For the network shown in fig.10, the switch k is closed at time t=0. . Capacitor C is initially charged to V_0 volts. Using Laplace transformation method, discover the expression for the current i(t).	**07**

OR

Q.5	**(a)**	Find out symmetry condition for inverse ABCD-parameters	**03**
	(b)	Generalize relationship of ABCD-parameters to y-parameters.	**04**
	(c)	In R-L circuit shown in fig.11, the switch is in position 1 long enough to establish steady state conditions and at t=0 is switched to position 2. Discover the expression for the current in the circuit using Laplace transform.	**07**

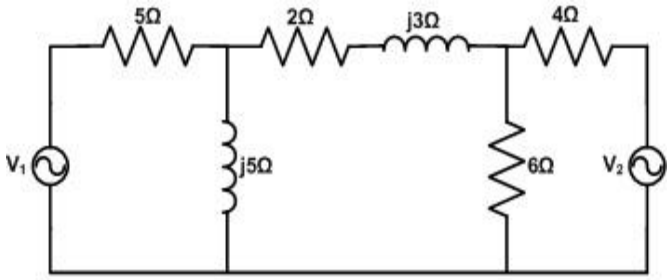

Fig.01

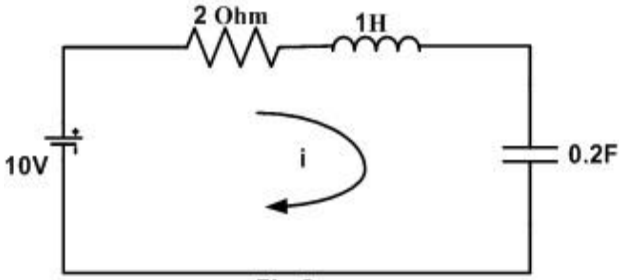

Fig.2

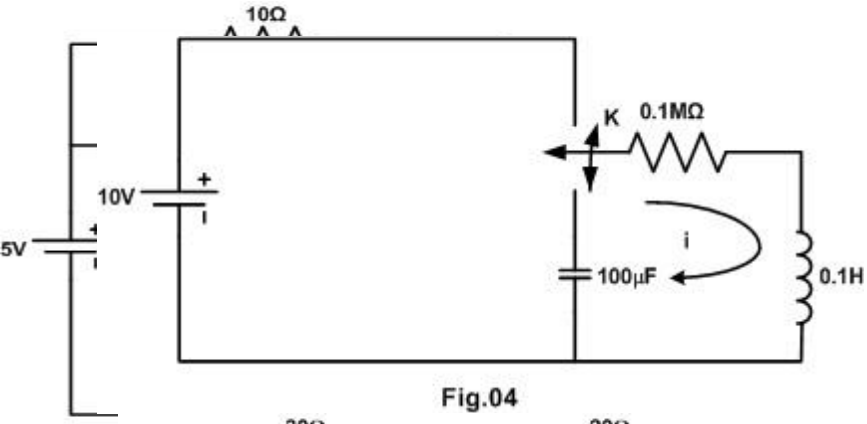

Fig.04

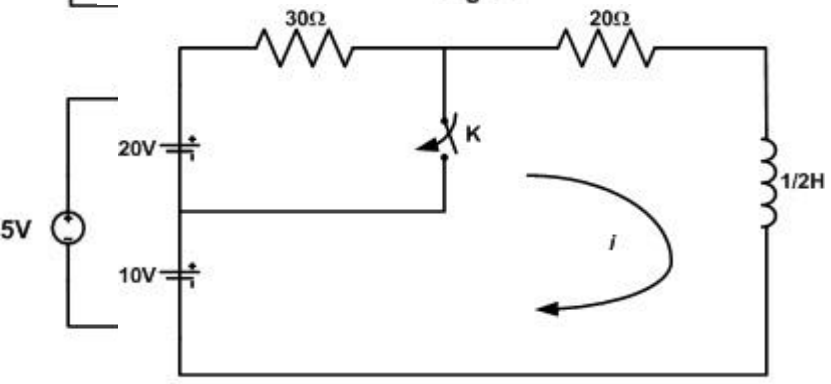

Fig.06

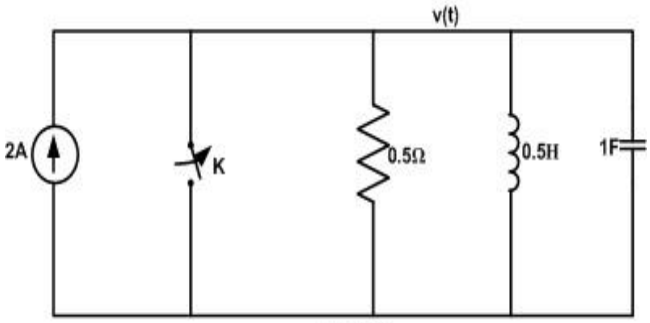

Fig.07

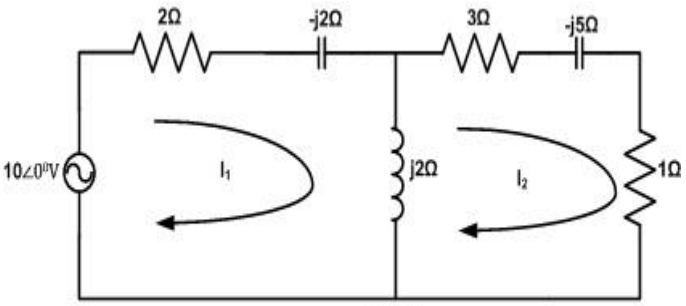

Fig.08

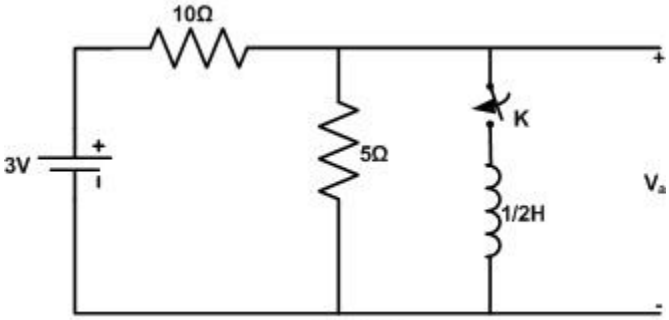

Fig.09

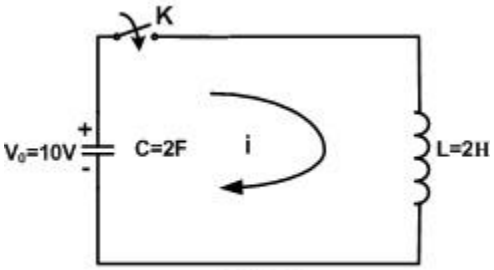

Fig.10

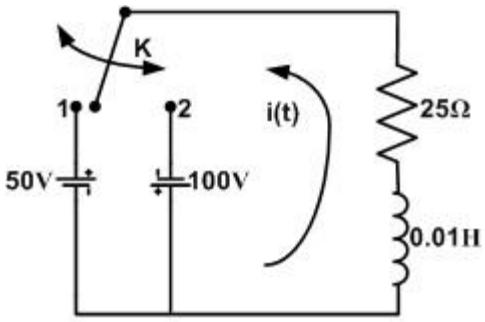

Fig.11

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