Seat No./Enrollment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 3 – EXAMINATION – SUMMER 2026

Subject Code: 3131103 **Date: 02/07/2026**

Subject Name: Network Theory

Time: 02:30 PM TO 05:00 PM **Total Marks: 70**

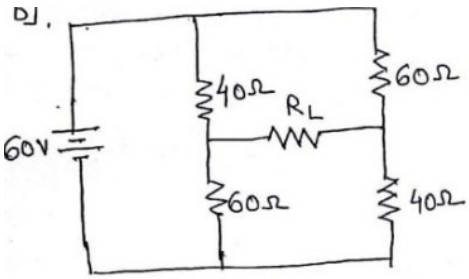
Instructions:

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.**

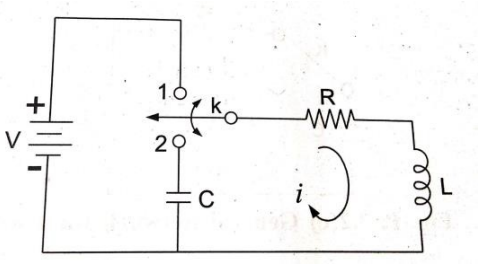
Q.1	**(a)**	Define ideal and practical current sources. Explain source transformation.	**03**
	(b)	Define EMF and potential difference with example.	**04**
	(c)	List Source transformation techniques rules	**07**
Q.2	**(a)**	Explain superposition theorem with example.	**03**
	(b)	A 5V DC source is connected to a series RC circuit with R=2kΩ and C=10μF at t=0. Assume the capacitor was initially charged to 2V (vC(0−)=2V). Calculate the voltage across the capacitor at t=50ms and the current through the resistor at t=0+.	**04**
	(c)	State and explain maximum power transfer theorem. Also derive the condition for maximum power transfer to the load for DC and AC circuits.	**07**

OR

Q.2	**(c)**	State and apply Thevenin's Theorem to determine equivalent.	**07**



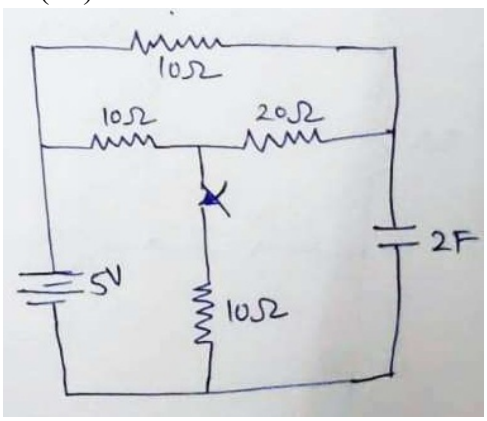
Q.3	**(a)**	Explain initial conditions in inductors/capacitors.	**03**
	(b)	List advantages of Laplace transformation method over classical method.	**04**
	(c)	In the network shown in figure, the switch k is changed from position 1 to 2 at t=0. Find values of i, di/dt and d2i/dt2 at t=0+ if R=1000Ω, L=1H, C=0.1μF and V=100V.	**07**



OR

Q.3	**(a)**	What are poles & zeros? Example.	**03**
	(b)	List property of Laplace Transform.	**04**

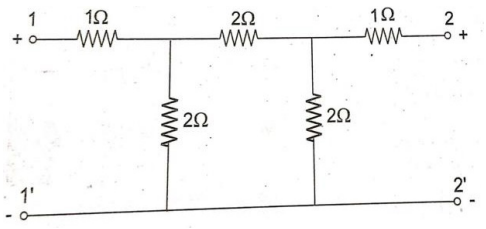
(c) The network shown in fig is in steady state with switch k is opened. At t=0, the switch is closed. For the element values given, determine the values of Va(0-) and Va(0+). **07**



Q.4 **(a)** Define z-parameters. **03**

(b) Derive relation between z & y. **04**

(c) Calculate Y parameters **07**



OR

Q.4 **(a)** What are ABCD parameters? **03**

(b) Explain admittance parameters. **04**

(c) Derive ABCD for cascaded two-port networks. **07**

Q.5 **(a)** Explain graph, subgraph, planar graph. **03**

(b) Define fundamental cut-set matrix. **04**

(c) Test PR function F(s)= 1 / (S+1) **07**

OR

Q.5 **(a)** Define 1) Tree 2) Connected Graph 3) Co-tree **03**

(b) Define dual network with example. **04**

(c) Test whether polynomial is Hurwitz :s2+3s+2 **07**

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