Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

Subject code: X20901 - PDDC **Subject Name: Circuits & Networks**

Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Explain Kirchoff's Current and Voltage Laws in detail. **08**

(b) Define the following terms with reference to network topology: (1) Node (2) Loop (3) Mesh (4) Graph (5) Tree (6) Co-tree **06**

Q.2 **(a)** For the circuit shown in fig.1, draw the oriented graph and obtain the (i) incidence matrix and (ii) tie-set matrix. **08**

(b) Determine the current i_x in the circuit of fig.2 using node analysis. **06**

OR

(b) Determine the voltage across 6 Ohms resistor in the network of fig.3 using nodal analysis. **06**

Q.3 **(a)** Determine the current i_x in the network of fig.4 using mesh analysis. **08**

(b) Explain the concept of initial conditions in elements. **06**

OR

Q.3 **(a)** In the network of fig.5 the switch k is closed at t = 0 with the capacitor uncharged and with zero current in the inductor. Find the values of i, di/dt, d^2i/dt^2 at t=0+, if V = 100 V, R = 10 Ω, L = 1 H and C = 10 μF. **08**

(b) Write a short note on poles and zeroes of network functions. **06**

Q.4 **(a)** For the network of fig.6 the capacitor is initially charged to a voltage Vo with the polarity indicated on the diagram. The switch k is closed at time t = 0. Determine the particular solution for the current in the circuit using Laplace transformation method. **08**

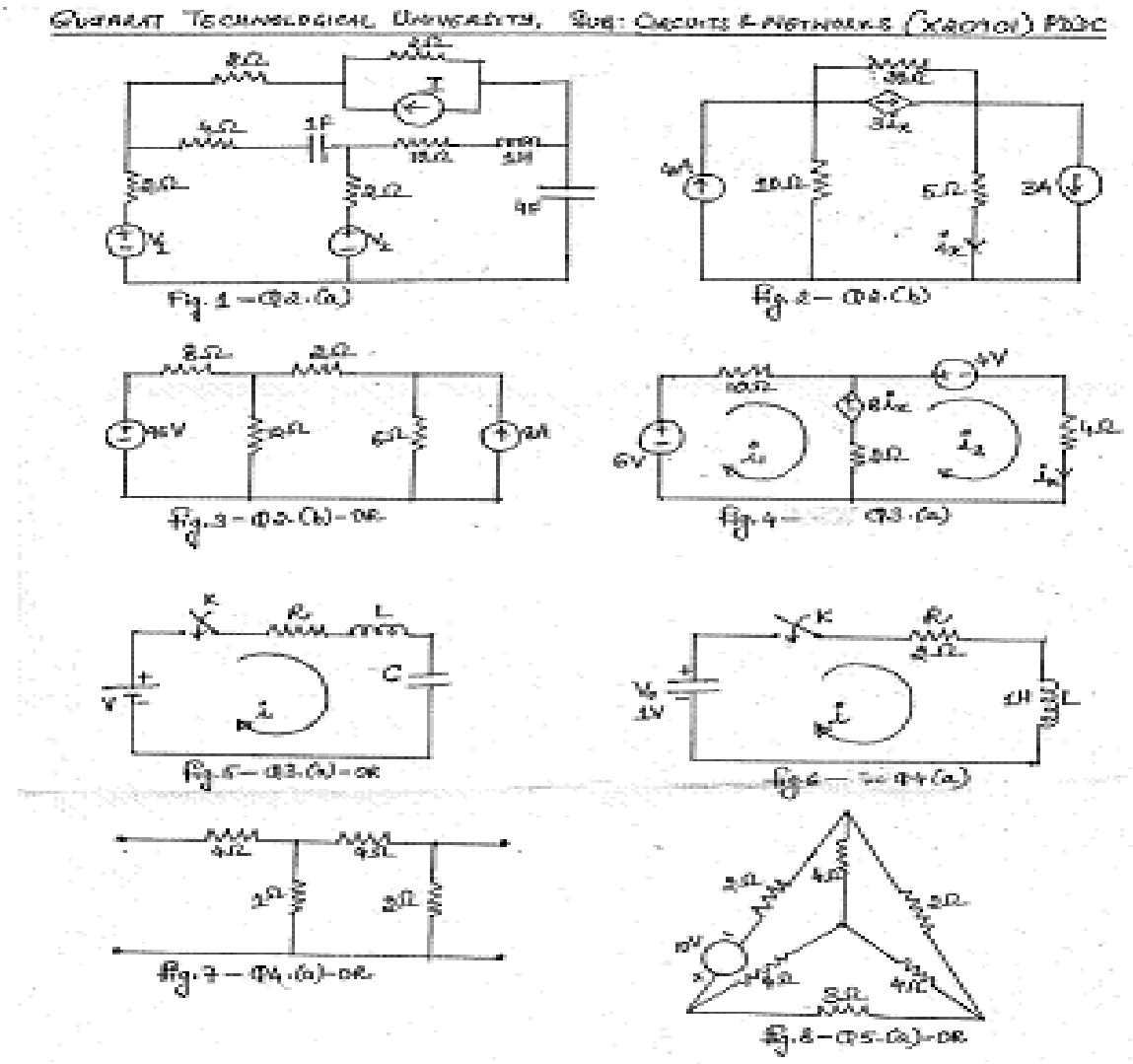
(b) State and explain Thevenin's Theorem. **06**

OR

Q.4	**(a)**	Find the Y – parameters for the network of fig.7.	**08**
Q.4	**(b)**	State and explain the Superposition Theorem.	**06**

Q.5	**(a)**	Explain (i) Ideal Sources (ii) Dependent Sources.	**08**
	(b)	Write a short note on the different techniques of source transformation.	**06**

OR

Q.5	**(a)**	Using Cut Set schedule obtain the values of branch voltages and currents for the network shown in fig.8.	**08**
	(b)	Explain the Maximum Power Transfer Theorem.	**06**

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