Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– III EXAMINATION – SUMMER 2020

Subject Code: 3131707 Date:04/11/2020

Subject Name: Network 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.**

			Marks
Q.1	**(a)**	Define following terms: (a) Linear and Nonlinear Networks (b) Unilateral and Bilateral Networks.	**03**
	(b)	Define following terms: (a) Time-Invariance and Time variance Networks. (b) Active and Passive Networks with example.	**04**
	(c)	Explain ideal, practical and dependent voltage and current sources with all necessary diagrams.	**07**
Q.2	**(a)**	Determine the inductance between the terminals for a three coil shown in fig 1	**03**
	(b)	For the network shown in the fig 2, determine the numerical value of the branch current i_1 using sources transformation theorem.	**04**
	(c)	Determine the node voltages V_1, V_2 and V_3 in a network of fig 3, using nodal analysis.	**07**
		OR	
	(c)	Find the current I_1, I_2, I_3 and I_4 for the network shown in fig 4, using mesh analysis	**07**
Q.3	**(a)**	State and explain Reciprocity theorem with example.	**03**
	(b)	Determine current i in a circuit shown in fig 5, using Super position theorem.	**04**
	(c)	Find the Norton's equivalent circuit across the terminal AB of the network shown in fig 6.	**07**
		OR	
Q.3	**(a)**	State and explain maximum power transfer theorem. Derive the condition for maximum power transfer to Resistive load for DC circuit	**03**
	(b)	State and explain Millman's theorem with proof.	**04**
	(c)	Find the current in 6 ohm resistor in the network shown in fig 7, using Thevenin's theorem	**07**
Q.4	**(a)**	Write the initial conditions in the inductor and capacitor at $t = 0^+$ and $t = \infty$.	**03**
	(b)	Find out the values of V, dV/dT and d^2V/dT^2 just after switching (at time t = 0^+) in the circuit shown in fig 8.	**04**
	(c)	For the circuit shown in the fig 9, the switch 'S' is at position '1' and the steady state condition is reached. The switched is moved to position '2' at t = 0. Find the current i(t) in both the cases, i.e. switch at position 1 and switch is at position 2	**07**
		OR	
Q.4	**(a)**	Write equations of Short circuit Admittance and Open Circuit Impedance parameters of a two port network.	**03**
	(b)	Derive the relationship between h-parameters and ABCD parameters	**04**
	(c)	Find Z parameters for the network of fig 10.	**07**

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Q.5 **(a)** State and explain final value theorem with proof. **03**

(b) Explain and derive the step response to R-L series circuit using Laplace Transformation method. (Fig 14.) **04**

(c) In the network of fig 11, if the switch has remained in position A for a long time and then moves to position B at t = 0. Find $v_c(t)$ for t >= 0 for R_2 = 405 ohm. (405Ω resistor is shown in fig.11) **07**

OR

Q.5 **(a)** Define following terms: (a) Oriented graph (b) Co-tree. c) Cut-set **03**

(b) How many trees are possible for the graph of the network of fig 12. **04**

(c) For the network shown in fig 13, draw the oriented graph and write i) the Incidence matrix, ii) Tieset matrix, and iii) f-Cutset matrix. **07**

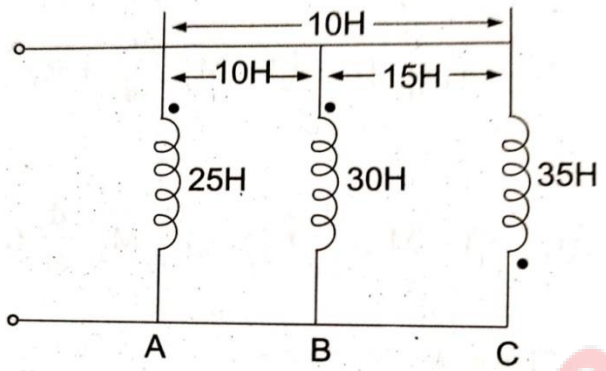

Fig 1.

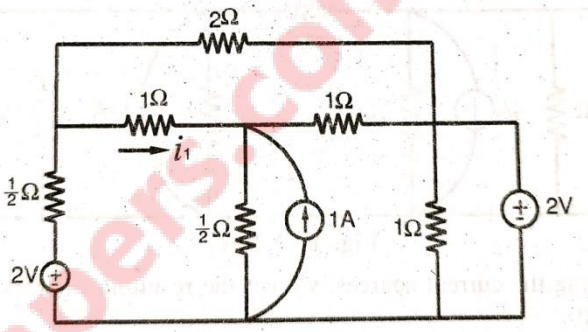

Fig 2.

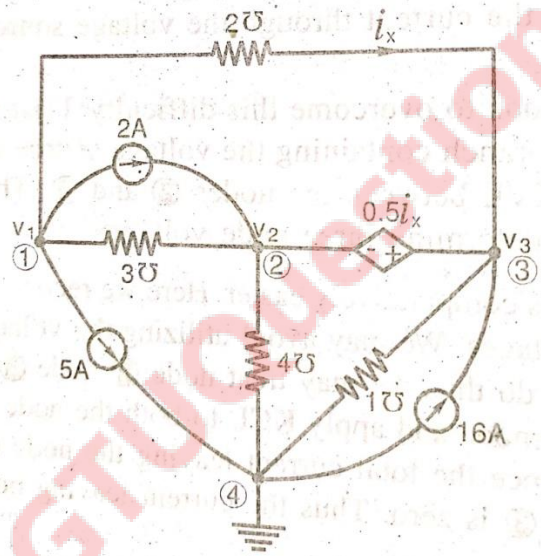

Fig 3.

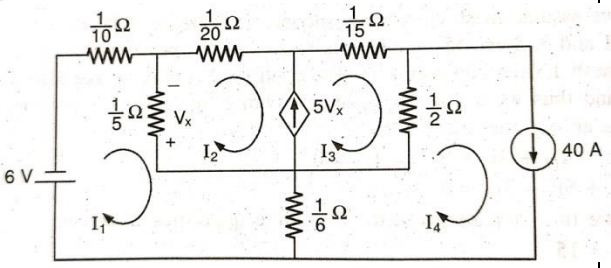

Fig 4.

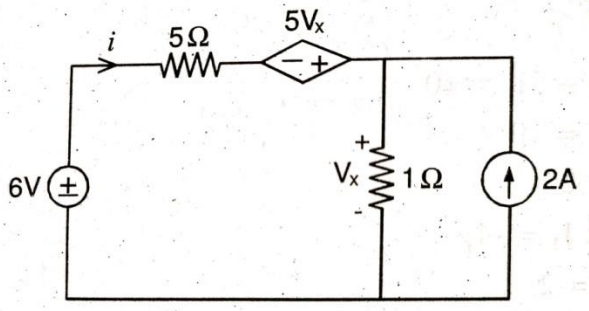

Fig 5.

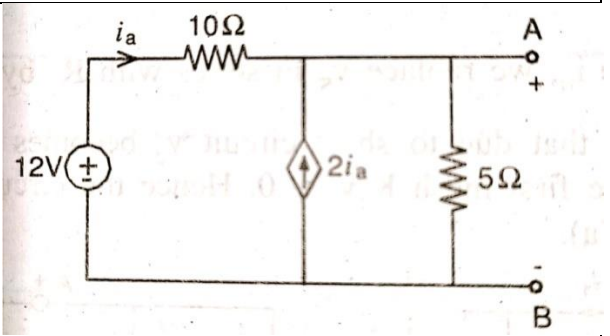

Fig 6.

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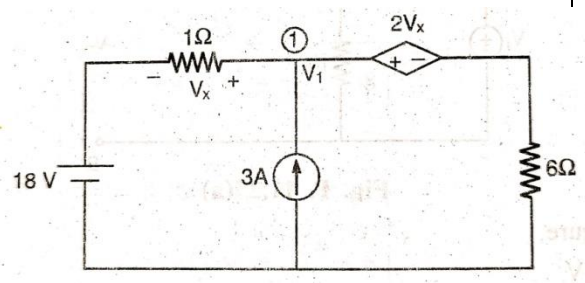

Fig 7.

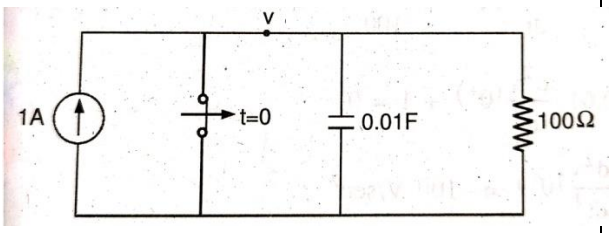

Fig 8.

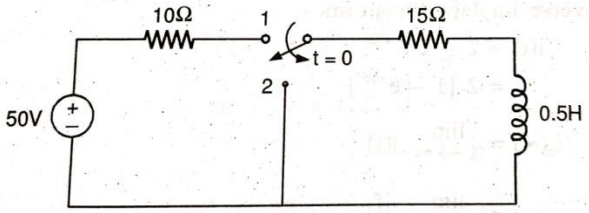

Fig 9.

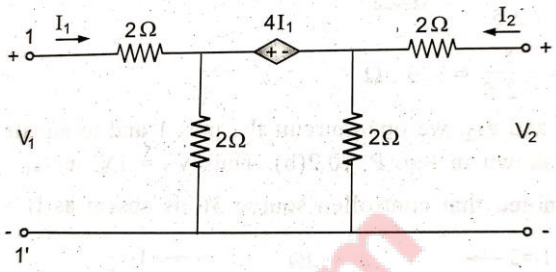

Fig 10.

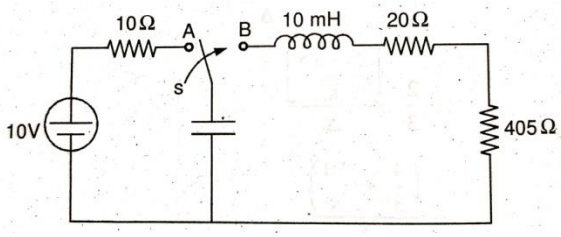

Fig 11.

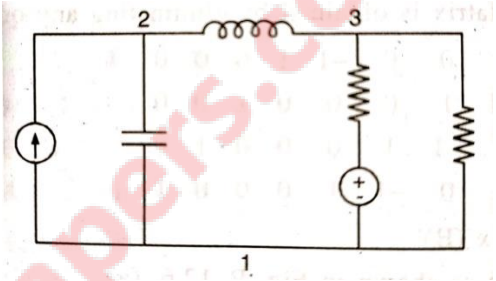

Fig 12.

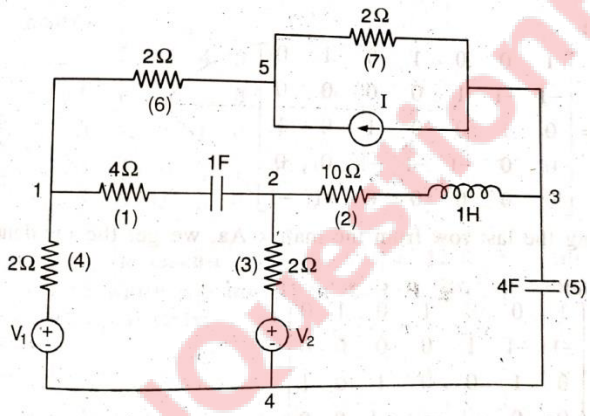

Fig 13.

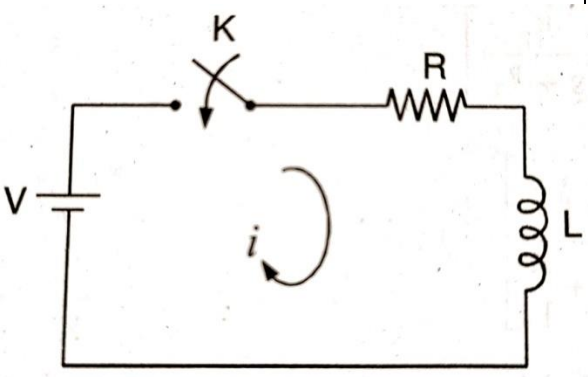

Fig 14.

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