Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– III (New) EXAMINATION – WINTER 2019

Subject Code: 3130906 Date: 28/11/2019

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.**

			MARKS
Q.1	**(a)**	State and explain Reciprocity theorem.	**03**
	(b)	State and explain Maximum power transfer theorem with suitable example.	**04**
	(c)	Obtain Thevenin's equivalent resistance of the circuit given in fig.1 to the left of the terminals a-b.	**07**
Q.2	**(a)**	In the fig.2, the switch k is first kept at position 1 and steady state condition is reached. At t = 0, switch is moved to position 2. Find the current in both the cases.	**03**
	(b)	Explain time constant in case of series R-L and series R-C circuit.	**04**
	(c)	In the fig.3, the switch is closed at t = 0. Find value of i, di/dt, d^2i/dt^2 at $t=0^+$. Assume initial current of inductor to be zero.	**07**
		OR	
	(c)	Explain in detail about transient response in series R-C circuit having DC excitation.	**07**
Q.3	**(a)**	Explain the importance of Dot convention in coupled circuit with suitable example.	**03**
	(b)	Draw impedance triangle and explain related terms.	**04**
	(c)	For the network shown in fig.4, find the node current I using node voltage technique.	**07**
		OR	
Q.3	**(a)**	In the fig.5, an unknown impedance of Z Ω is connected in series with $(5 + j8)$ Ω coil. If $I = 2.5 \angle -15^0$ A, find value of Z.	**03**
	(b)	Find the current in a series R-L circuit having R = 2 Ω and L =10 H while a DC voltage of 100 V is applied. What is the value of this current after 5 seconds of switching on?	**04**
	(c)	The circuit shown in fig.6 is operating in the sinusoidal steady state. Find I_1 and I_2 by loop analysis and determine ratio V_0 / V_s. Assume $\omega = 10^3$ rad / sec.	**07**
Q.4	**(a)**	Find driving point impedance of the given network shown in fig.7.	**03**
	(b)	Find inverse Laplace of given F(s). $F(s) = \frac{(s+2)}{s\,(s+3)\,(s+4)}$	**04**
	(c)	Obtain the step response for the R-L series circuit shown in fig.8.	**07**
		OR	

Q.4	**(a)**	Explain characteristics of unit ramp function.	**03**
	(b)	Determine the transfer function $H(s) = V_0(s) / I_0(s)$ of the circuit in fig.9.	**04**
	(c)	Find $v_0(t)$ in the circuit of fig.10, assuming zero initial condition.	**07**
Q.5	**(a)**	What is the condition of symmetry of all different two port parameters?	**03**
	(b)	Briefly describe h parameters for a two port network.	**04**
	(c)	Obtain Z-parameters of the circuit shown in fig.11.	**07**
		OR	
Q.5	**(a)**	Find Y-parameters of the circuit shown in fig.12	**03**
	(b)	Derive expression of ABCD parameters in terms of Z parameters.	**04**
	(c)	Determine Z-parameters of the circuit shown in fig.13.	**07**

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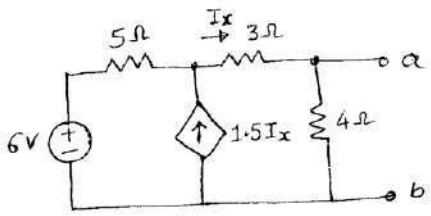

fig. 1

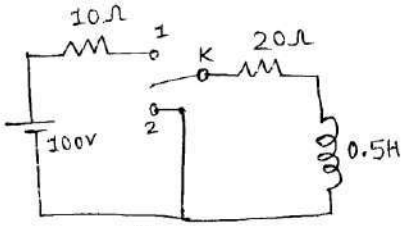

fig. 2

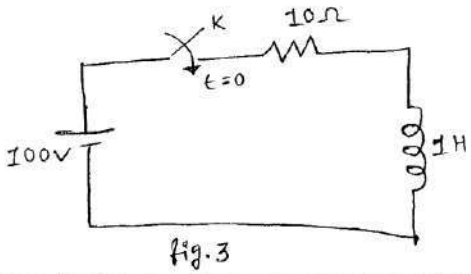

fig. 3

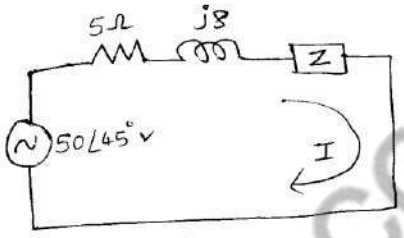

fig. 5

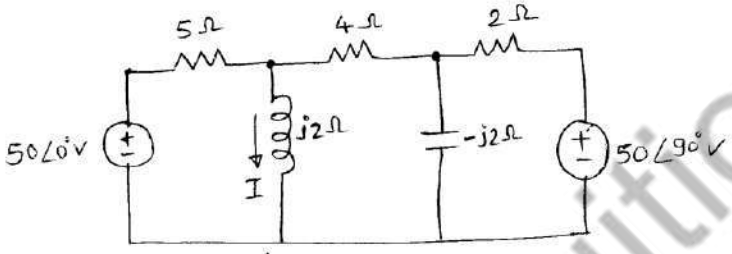

fig. 4

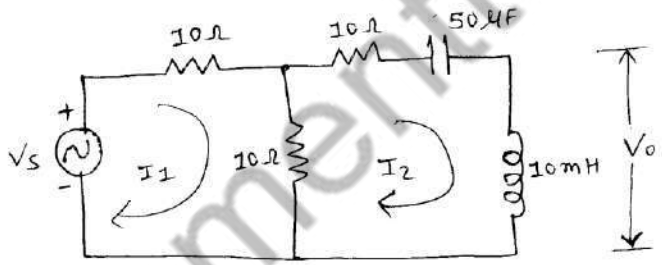

fig. 6

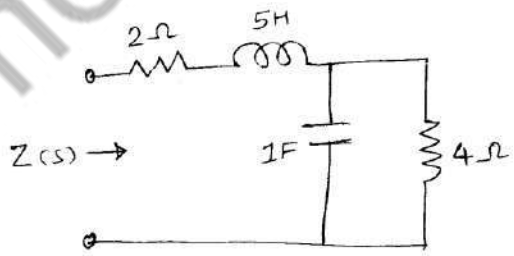

fig. 7

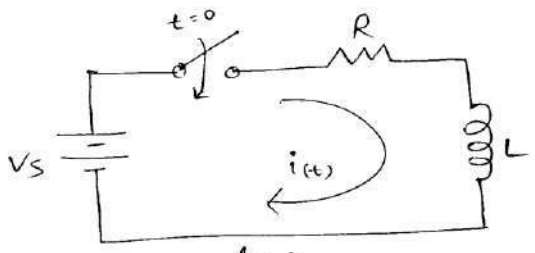

fig. 8

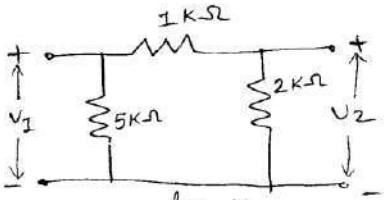

fig. 12

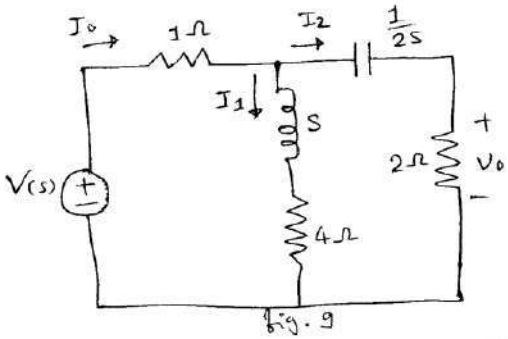

fig. 9

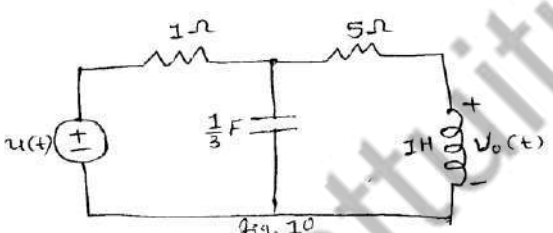

fig. 10

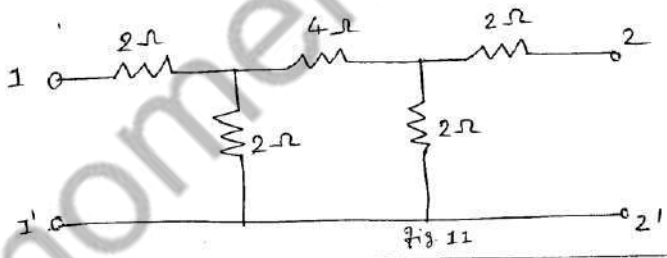

fig 11

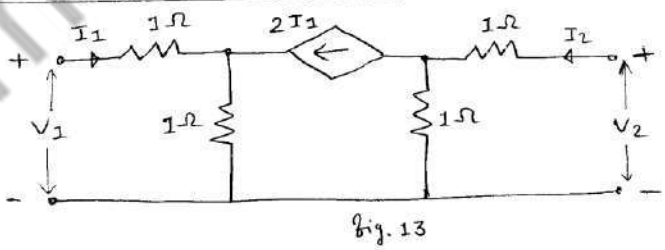

fig. 13