Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–III (NEW) EXAMINATION – WINTER 2020

Subject Code:3130906 Date:10/03/2021

Subject Name:Electrical Circuit Analysis

Time:10:30 AM TO 12:30 PM Total Marks:56

Instructions:

1. **Attempt any FOUR questions out of EIGHT questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			Marks
Q.1	**(a)**	Explain Norton's theorem.	**03**
	(b)	Determine current flowing through R_L for the network shown in Fig. 1 using Nodal voltage technique.	**04**
	(c)	Determine current flowing through 5 Ω resistance for the network shown in Fig. 2 using superposition theorem.	**07**
Q.2	**(a)**	In the circuit shown in Fig.3, the switch 'K' is closed at t=0. Assuming zero initial current through inductor. Find '*i*', 'di/dt' and 'd^2i/dt^2' at $t = 0^+$.	**03**
	(b)	Obtain step response of series R-L circuit.	**04**
	(c)	Determine the load resistance R_L to be connected at terminal A-B in order to transfer maximum power from the network shown in Fig. 4. Also, determine the value of maximum power.	**07**
Q.3	**(a)**	Determine equivalent inductance between terminals A-B for the coupled circuit shown in Fig. 6.	**03**
	(b)	Explain the steps to obtain dual of a network with suitable example.	**04**
	(c)	Determine power supplied by 20 V source for the network shown in Fig. 7 using loop current method.	**07**
Q.4	**(a)**	Explain dot rule for coupled circuit.	**03**
	(b)	Draw power triangle for series R-L circuit and define related terms.	**04**
	(c)	Determine current flowing through R_L= 5 Ω resistance for the network shown in Fig. 8 using Thevenin's theorem.	**07**
Q.5	**(a)**	Define unit ramp function. Obtain Laplace transform of unit ramp function.	**03**
	(b)	In the network shown in Fig. 9, the switch is closed at t=0. By the method of Laplace transform, determine the current. Assume zero initial condition. Take ω = 10 r/s.	**04**
	(c)	Define poles and zeros of network function. Explain significance of poles and zeros in different network functions.	**07**
Q.6	**(a)**	Obtain driving point impedance for the network shown in Fig. 10.	**03**
	(b)	Draw magnitude and phase plot of a voltage transfer function for the network shown in Fig. 11	**04**

	(c)	For the network shown in Fig. 12, the switch is in position 1 long enough to establish steady state. At t = 0, the switch is moved to position 2. Find the expression for the current in the circuit.	**07**
Q.7	**(a)**	Define H-parameter of a two-port network.	**03**
	(b)	Obtain condition for reciprocity and symmetry of a two port network in terms of Z-parameters.	**04**
	(c)	Obtain y-parameters for the network shown in Fig. 13	**07**
Q.8	**(a)**	A two port network is represented by following equations: $V_1 = 24\ I_1 + 8\ I_2$ $V_2 = 8\ I_1 + 32\ I_2$ Draw the T-network represented by above equations.	**03**
	(b)	Obtain h-parameters for the network shown in Fig. 14	**04**
	(c)	Obtain ABCD parameters in terms of Z-parameters for a two-port network.	**07**

Figures

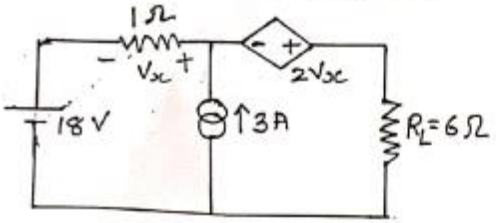

Fig. 1

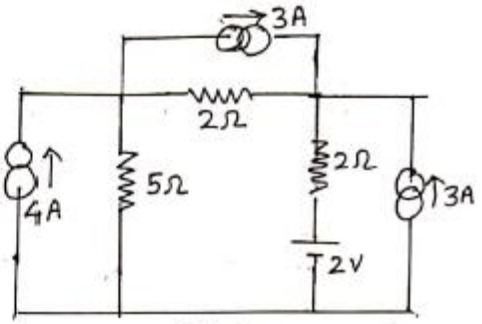

Fig. 2

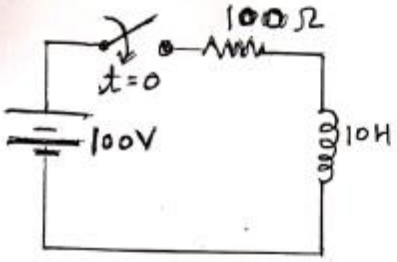

Fig. 3

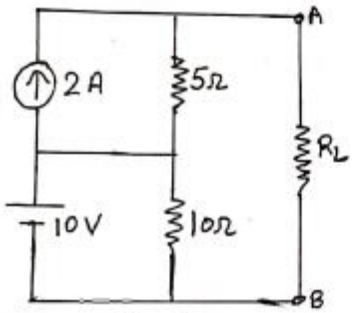

Fig. 4

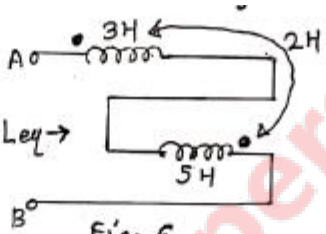

Fig. 6

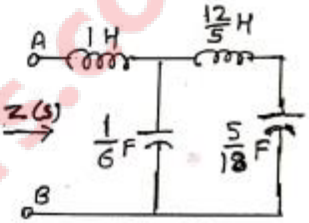

Fig. 10

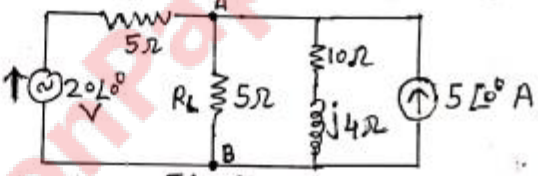

Fig. 8

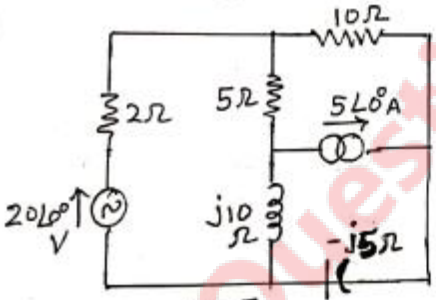

Fig. 7

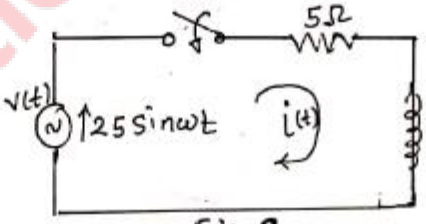

Fig. 9

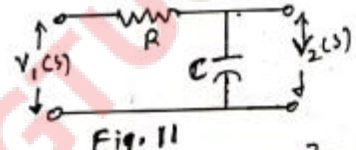

Fig. 11

Fig. 14

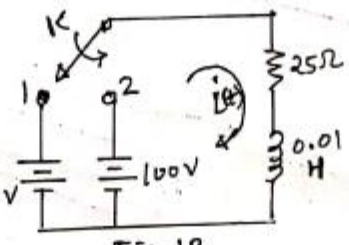

Fig. 12

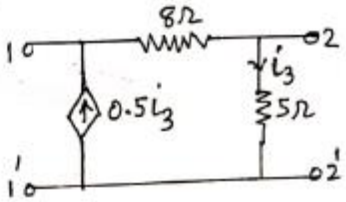

Fig. 13

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