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GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (NEW) - EXAMINATION – SUMMER 2018

Subject Code:2130901 **Date:21/05/2018**

Subject Name:Circuits and Networks

Time:10:30 AM to 01:00 PM **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)**	Define following terms: (a) Linear and Nonlinear Networks (b) Lumped and Distributed Networks	**03**
	(b)	Construct the exact dual of the network of figure:1.	**04**
	(c)	In the network of figure:2 , determine the i_2 using Source Transformation method.	**07**
Q.2	**(a)**	Determine the inductance between the terminals for a 3 coil shown in figure:3.	**03**
	(b)	Find the voltage drop across x-y for figure:4.	**04**
	(c)	Find the value of V_x in the circuit of figure:5, using mesh analysis.	**07**
		OR	
	(c)	In the network of figure:6, determine the node voltages V_1, V_2, V_3 using node analysis.	**07**
Q.3	**(a)**	What is time constant? What is its significance?	**03**
	(b)	How the following elements will behave at $t = 0$ and $t = \infty$. Draw the equivalent network as well. (a) Inductor (b) Capacitor.	**04**
	(c)	For the network shown in figure:7, the switch k is open for a long time and closed at $t = 0$. Determine $v_c(t)$.	**07**
		OR	
Q.3	**(a)**	Derive Laplace Transform of $f(t) = tu(t)$.	**03**
	(b)	In the circuit shown in figure:8, voltage and current expressions are $v(t) = 100e^{-1000t}V, t \geq 0$ and $i(t) = 5e^{-1000t}mA, t \geq 0$. Find (a) R, C and Time Constant (τ). (b) Initial energy stored in capacitor.	**04**
	(c)	In a network of figure:9, a steady state is reached with the switch k open. At t=0, the switch is closed. Determine the values of $v_a(0^-)$ and $v_a(0^+)$.	**07**
Q.4	**(a)**	State and explain superposition's theorem.	**03**
	(b)	Using Laplace transformation, solve the following differential equation. $\frac{d^2i}{dt^2} + 4\frac{di}{dt} + 8i = 8u(t)$. Given that $i(0^+) = 3$ and $\frac{di}{dt}(0^+) = -4$.	**04**
	(c)	Find the Norton's equivalent circuit across terminals AB of the circuit shown in figure:10.	**07**
		OR	
Q.4	**(a)**	State and explain Maximum Power Theorem.	**03**
	(b)	Explain and derive the step response to R-L series circuit using Laplace Transformation method.	**04**
	(c)	Find the Thevenin's equivalent network across the terminals A and B for figure:11.	**07**
Q.5	**(a)**	Write equations of Short circuit Admittance and Open Circuit Impedance parameters of a two port network.	**03**
	(b)	Derive formulae to convert given y – parameters into h - parameters.	**04**
	(c)	For the network of figure: 12, find the z and y parameters.	**07**
		OR	

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Q.5 **(a)** Explain the following terms: (a) Tree (b) Mesh (c) Graph. **03**

(b) State the procedure to obtain solution of a network using Laplace Transform method. State advantages of Laplace method over classical method. **04**

(c) For the circuit shown in figure:13, draw the oriented graph and write the (a) incidence matrix (b) f- cutset matrix and (c) tieset matrix. **07**

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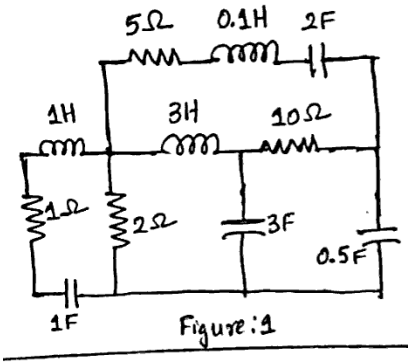
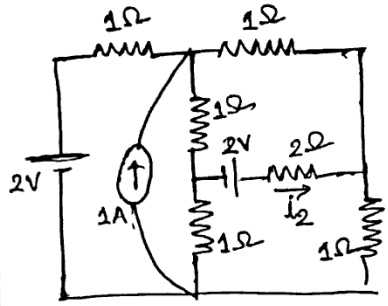


Figure:1



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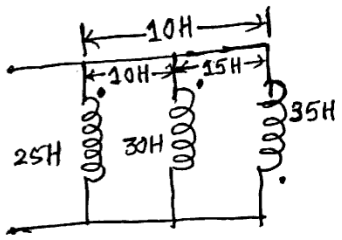

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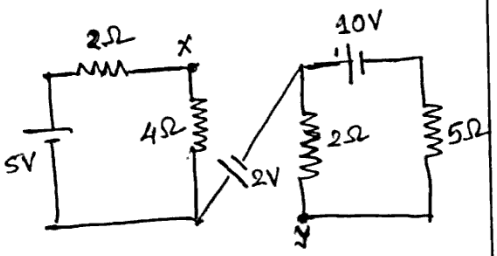

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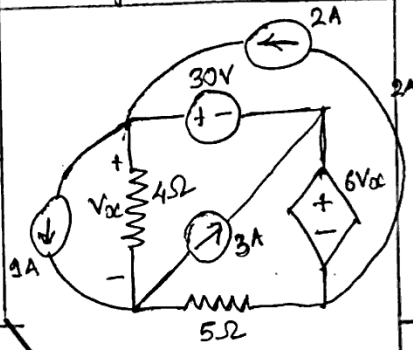


Figure:5

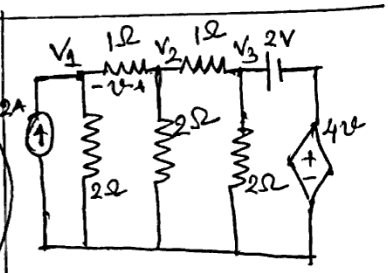
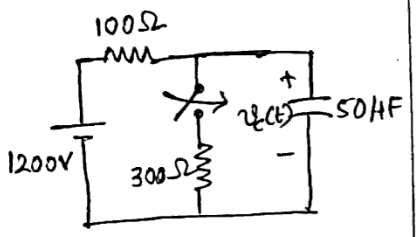


Figure:6



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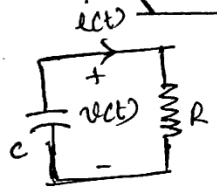

Figure:8

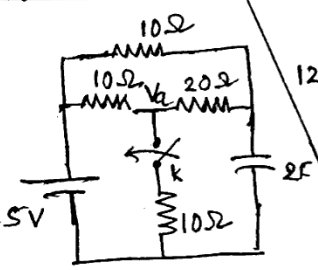

Figure:9

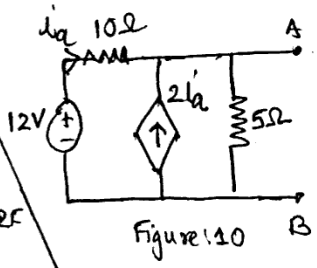

Figure:10

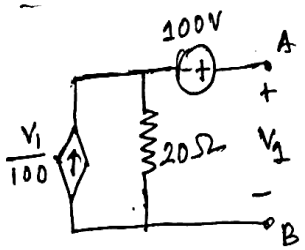

Figure:11

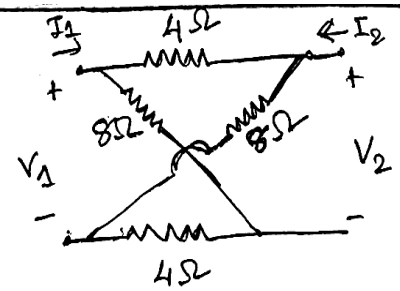

Figure:12

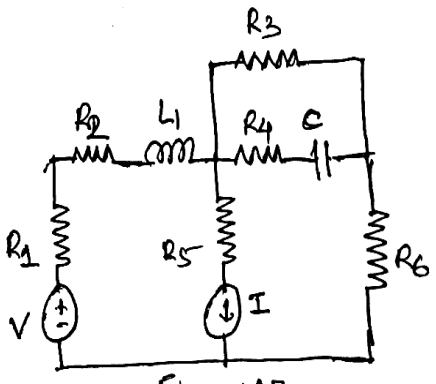

Figure:13

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