Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (NEW) • EXAMINATION – SUMMER 2015

Subject Code: 2130901 **Date:09/06/2015**

Subject Name: Circuits and Networks

Time:02:30 pm – 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.**

Q.1	**(a)**	Explain the terms: (i) Linear (ii) Bilateral (iii) Passive (iv) Reciprocal (v) Time invariant (vi) Oriented graph and (vii) Tree.	**07**
	(b)	Justify: the current in an inductor and voltage across a capacitor cannot change instantaneously.	**07**
Q.2	**(a)**	State and explain maximum power transfer theorem. Also derive the condition for maximum power transfer to the load for DC and AC circuit.	**07**
	(b)	Using mesh analysis determine mesh current i and the value of k which causes $i=0$ if $V_1=10$ v and $V_2=2$ v for the network shown in figure 1.	**07**
		OR	
	(b)	Using nodal analysis find the value of k such that V_y is zero for the network shown in figure 2.	**07**
Q.3	**(a)**	What is significance of initial condition? Write initial conditions for R, L and C at $t=0_+$ and at $t=\infty$.	**07**
	(b)	For the network shown in figure 3 the switch k is closed at $t=0$, also it reaches a steady state with the switch k open. Find the current $i(t)$ for all time.	**07**
		OR	
Q.3	**(a)**	What is time constant? Explain time constant in terms of RL and RC circuit.	**07**
	(b)	Determine $V_b(0_+)$ and $V_b(\infty)$ for the network shown in figure 4, which reaches to steady state with switch k open and at $t=0$, the switch k is closed.	**07**
Q.4	**(a)**	Explain concept of poles and zeros and their significance in network functions.	**07**
	(b)	Find the h parameters for the network shown in figure 5.	**07**
		OR	
Q.4	**(a)**	Find Laplace transform of $f_1(t)=\cos \omega t$ and $f_2(t)=e^{-at}\sin \omega t$.	**07**
	(b)	For the network shown in figure 6 determine voltage transfer gain $G_{12}=V_2/V_1$.	**07**
Q.5	**(a)**	Derive relationship between incidence matrix (A), fundamental tie-set matrix (B_f) and fundamental cut-set matrix (Q_f).	**07**
	(b)	Find the Z parameters for the network shown in figure 7.	**07**
		OR	
Q.5	**(a)**	Derive expression of h parameter in terms of Z and Y parameters.	**07**
	(b)	For the network shown in figure 8 draw the oriented graph. Also obtain incidence matrix (A), fundamental tie-set matrix (B_f) and fundamental cut-set matrix (Q_f).	**07**

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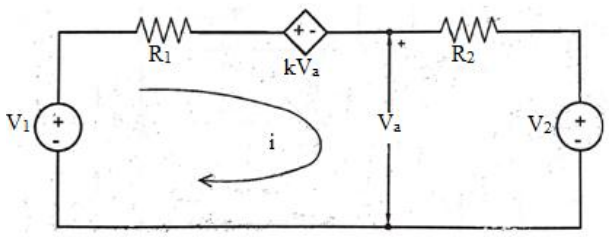

Figure 1

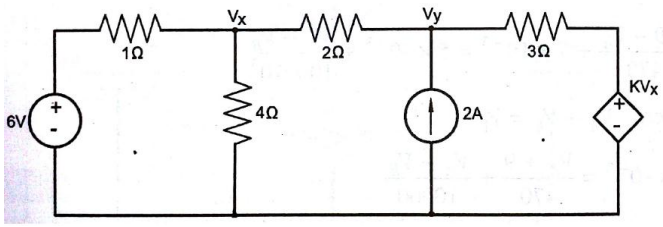

Figure 2

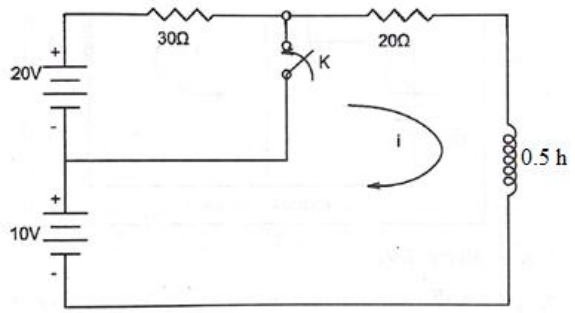

Figure 3

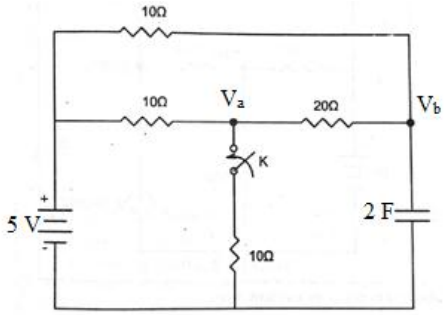

Figure 4

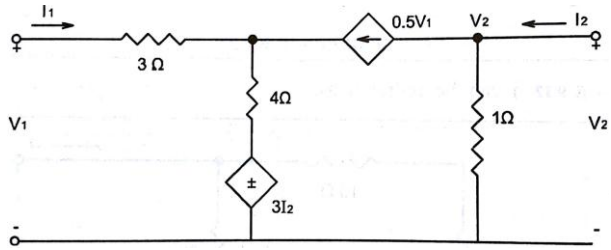

Figure 5

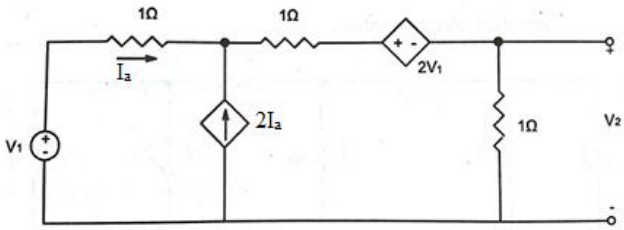

Figure 6

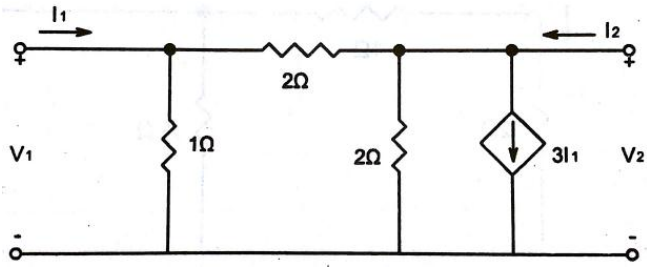

Figure 7

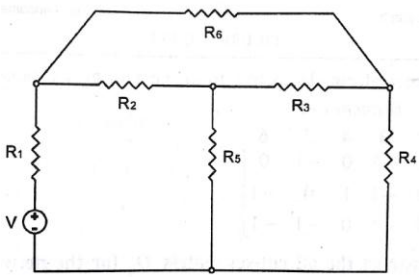

Figure 8