Sem-III Electrical Network Imst 3/11/08

5759-07. CD-6729

(REVISED COURSE)

(3 Hours) [Total Marks : 100

N.B. (1) Question No.1 is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) Assume any data if **required**.
(4) **Figures** to the **right** indicate **full** marks.

1. Attempt any **five** :— 20

(a) Find power supplied by 10 V source by KCL.

(b) Draw the oriented graph from the tieset matrix given below :—

Tie sets ↓	Branches (b) → 1	2	3	4	5	6	7
5	0	0	−1	−1	1	0	0
B = 6	−1	1	1	1	0	1	0
7	1	−1	−1	−1	0	0	1

(c) Compute the ABCD — parameters of a two port network if the Y-parameters are :—
$Y_{11} = 0{\cdot}6$ mho, $Y_{22} = 0{\cdot}3$ mho, $Y_{21} = Y_{12} = -0{\cdot}2$ mho.

(d) Find condition for reciprocity in h-parameters.

(e) Check whether the following functions are of R–L, R–C or L–C types.

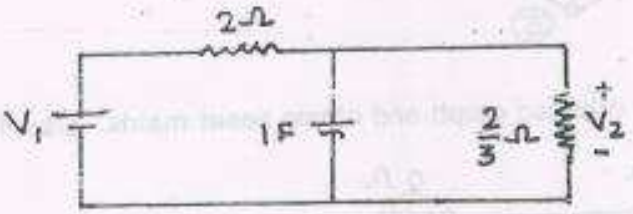
(i) $Z(s) = \dfrac{s^3 + 2s}{s^4 + 4s^2 + 3}$

(ii) $Z(s) = \dfrac{s^2 + 6s + 8}{s^2 + 8s + 15}$

(iii) $Z(s) = \dfrac{s^2 + 5s + 6}{s^2 + 4s}$

(iv) $Z(s) = \dfrac{s^4 + 7s^2 + 6}{s^3 + s}$.

(f) Find value of $V_1(s)$ if $V_2 = 1 - e^{-2t}$ for the given network.



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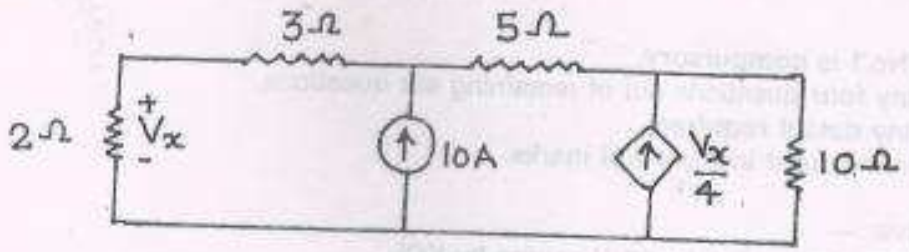
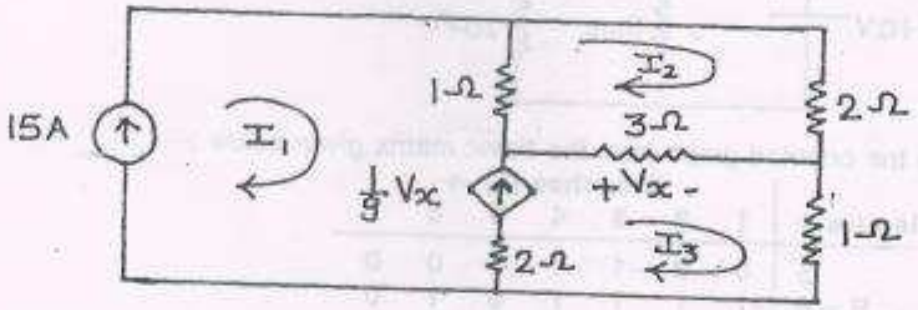
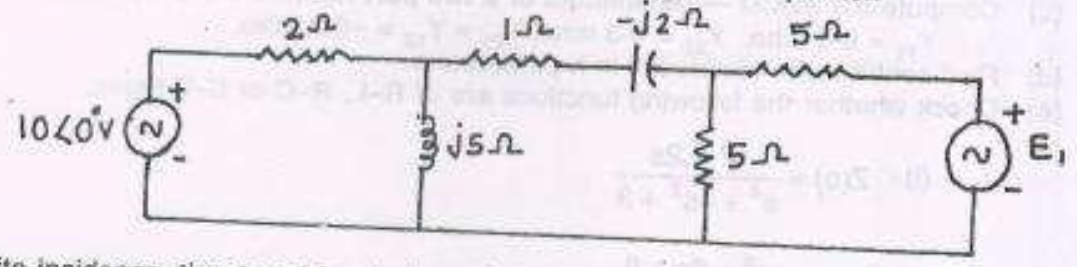
2. (a) Find current through 10 Ω resistor by Thevenin's theorem.



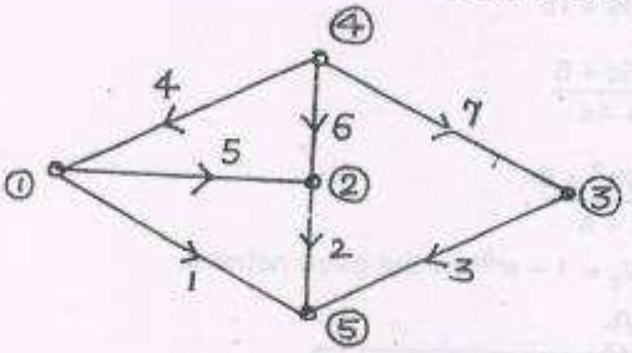
(b) Find I_1, I_2 and I_3 by KVL :—



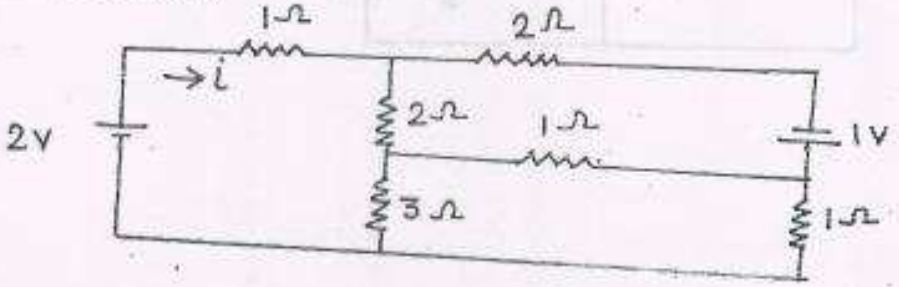
3. (a) Find E_1 in **figure**, such that there is no current through the capacitor.



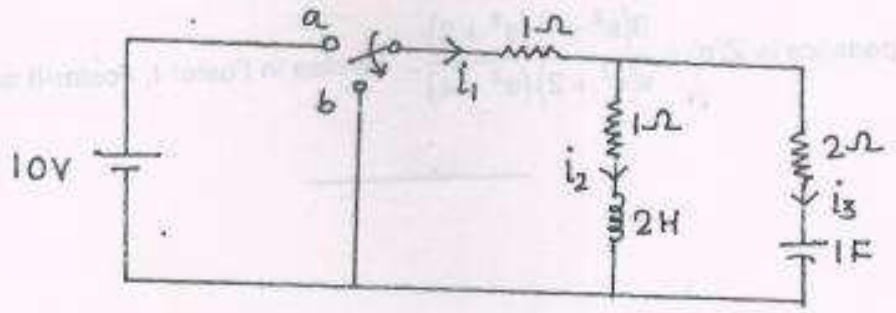
(b) Write incidence, tieset and f-cutset matrix for the given graph. 10



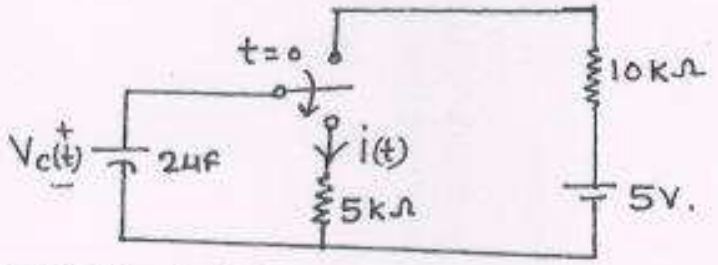
4. (a) For the network shown, draw oriented graph and obtain tieset matrix. Use this matrix to calculate the current 'i'. 10



(b) Determine i_1, i_2, i_3, $\frac{di_2}{dt}$ and $\frac{di_3}{dt}$ at $t = 0^+$. 10

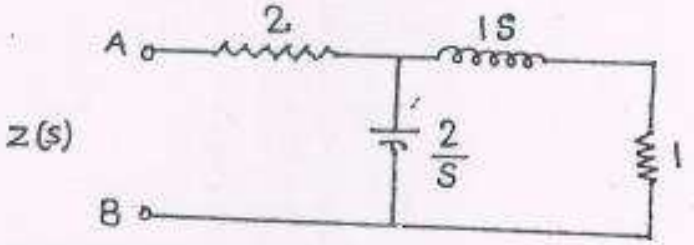


(a) Find (i) $V_c(0^+)$, $i(0^+)$ and $i(0^-)$ 10
(ii) Time constant for $t > 0$, and
(iii) $i(t)$ for $t > 0$.

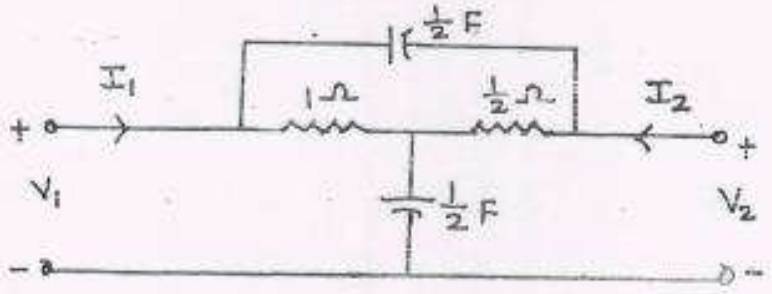


(b) A series RLC circuit with $R = 3\ \Omega$, $L = 1$ H and $C = 0.5$ F is excited by a unit-step voltage. Obtain the expression for current using Laplace transform. Assume that the circuit was initially relaxed. 10

6. (a) Find the driving point impedance Z(s) of the network shown in **figure**. Locate the poles and zeros of Z(s) in s-plane. If the voltage $V(t) = e^{-6t}$ is applied at the terminals A – B at $t = 0$, determine the current through the resistance of 2 Ω in time domain. 10



(b) For the given network determine Y-parameters using interconnection of two-port networks. 10



7. (a) Check whether the function $Z(s)=\frac{2s^2+2s+1}{s^3+2s^2+s+2}$ is a positive real function. 5

(b) An impedance is $Z(s)=\frac{8(s^2+1)(s^2+3)}{s(s^2+2)(s^2+4)}$. Realize in Foster-I, Foster-II and Cauer-I form. 15
