

Sem-III Electrical Network Inst 31103

5759-07.

(REVISED COURSE)

CD-6729

(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.

20

1. Attempt any five :—

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



- (b) Draw the oriented graph from the tie-set matrix given below :—

Branches (b) →

Tie sets ↓	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 :—
 $Y_{11} = 0.6 \text{ mho}$, $Y_{22} = 0.3 \text{ mho}$, $Y_{21} = Y_{12} = -0.2 \text{ mho}$.
- (d) Find condition for reciprocity in h-parameters.
- (e) Check whether the following functions are of R-L, R-C or L-C types.

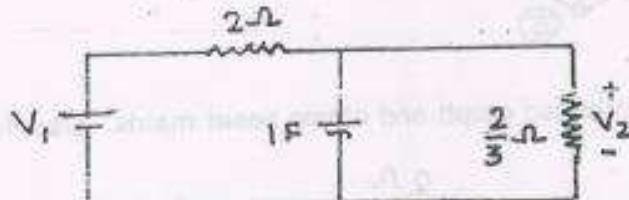
$$(i) Z(s) = \frac{s^3 + 2s}{s^4 + 4s^2 + 3}$$

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

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

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

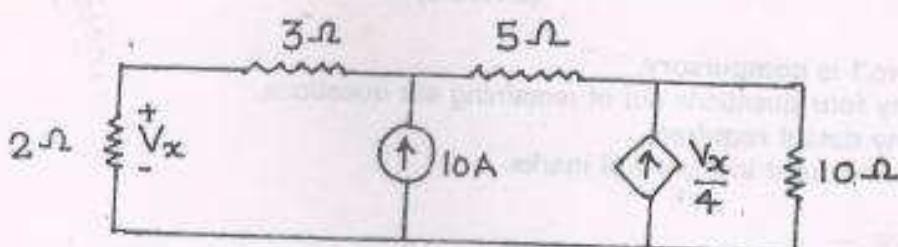
- (f) Find value of $V_1(s)$ if $V_2 = 1 - e^{-2t}$ for the given network.



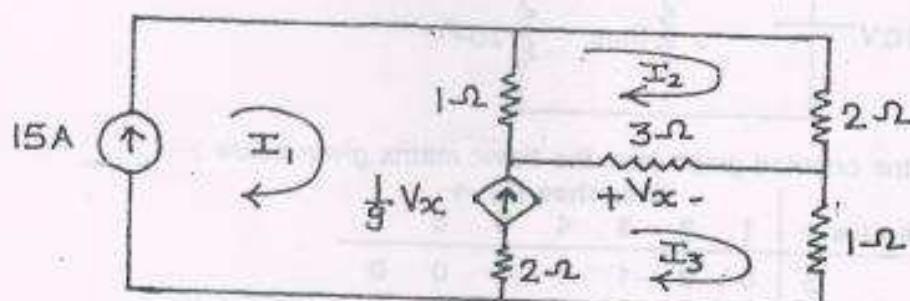
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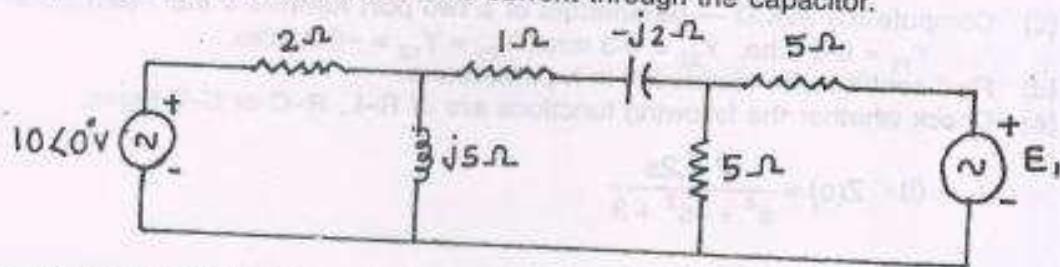
2. (a) Find current through $10\ \Omega$ resistor by Thevenin's theorem.



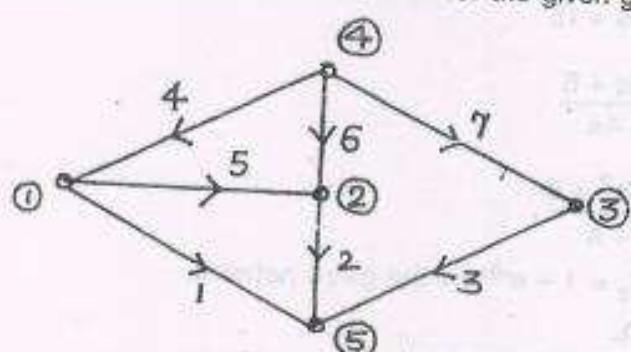
- (b) Find I_1 , I_2 and I_3 by KVL. —



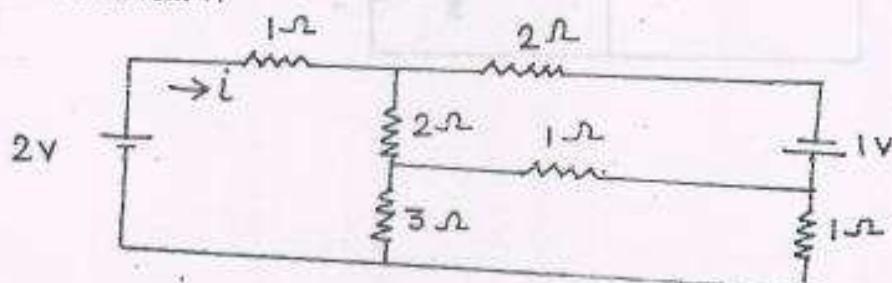
3. (a) Find E_1 in figure, such that there is no current through the capacitor.



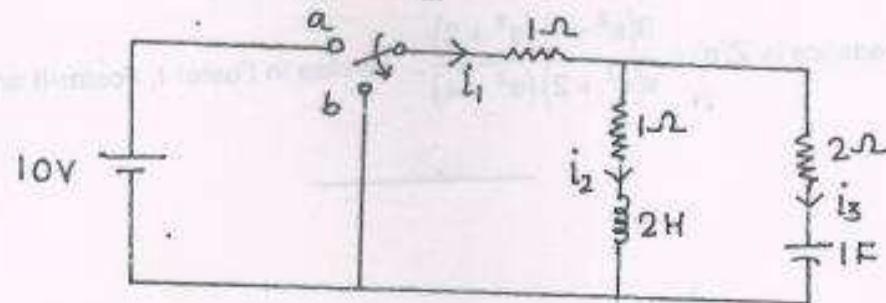
- (b) Write incidence, tieset and i-cutset matrix for the given graph.



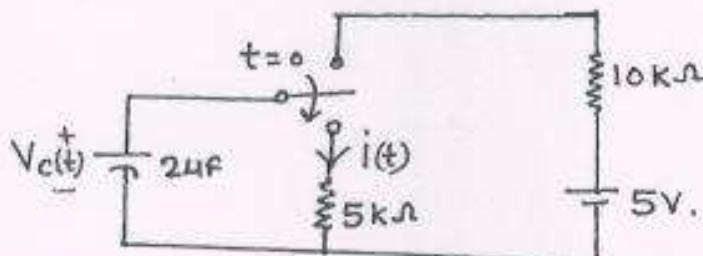
4. (a) For the network shown, draw oriented graph and obtain tieset matrix. Use this matrix to calculate the current i . — 10



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

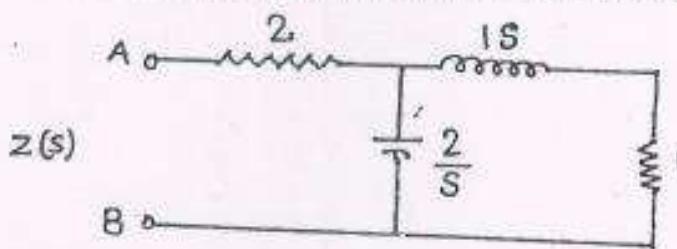


- (a) Find (i) $V_c(0^+)$, $i(0^+)$ and $i(0^-)$
(ii) Time constant for $t > 0$, and
(iii) $i(t)$ for $t > 0$.

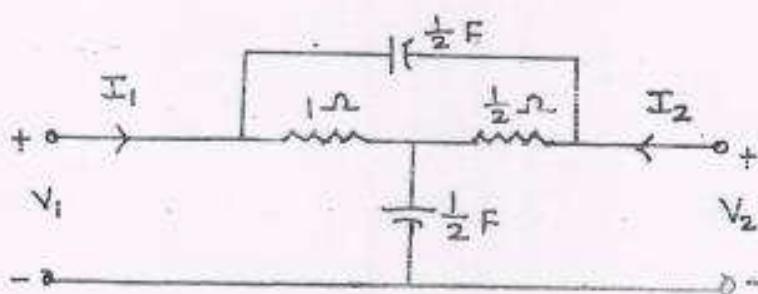


- (b) A series RLC circuit with $R = 3 \Omega$, $L = 1 \text{ H}$ and $C = 0.5 \text{ F}$ is excited by a unit-step voltage. Obtain the expression for current using Laplace transform. Assume that the circuit was initially relaxed.

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 $V(t) = e^{-st}$ is applied at the terminals A – B at $t = 0$, determine the current through the resistance of 2Ω in time domain.



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



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

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(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



Q1. Answer questions in sequence starting from Q1. Total marks available are 15. Please keep Q15 answer in one page. All other answers, provided scanned prints, include all necessary steps and details.

Q2. Using the attached voltage source, calculate initial (0+) components. Then, obtain steady state response and transient response. Assume initial conditions are zero. 10



Q3. Answer this part by connecting nodes A and B using Y connection. Assume steady state.

