Sem-III Electrical Network Analysis & Synthesis (4)
Exam oct 2009 Biom 30/12/09

116 2nd Exm.09-DD-(A)

Con. 5534-09.

(REVISED COURSE)

SP-7394

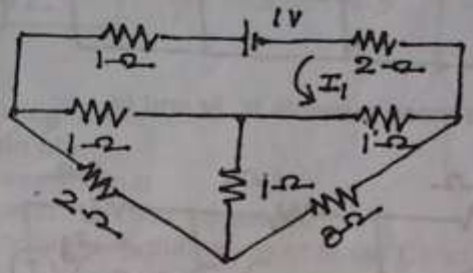
(3 Hours)

[Total Marks : 100

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

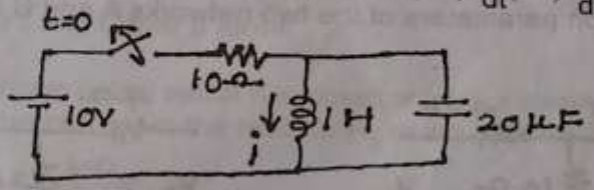
1. (a) Check the following function for Hurwitz using Routh array method :— 5
$F(s) = s^4 + 8s^3 + 4s^2 + 2s + 8$.

(b) Draw dual of a given network :— 5

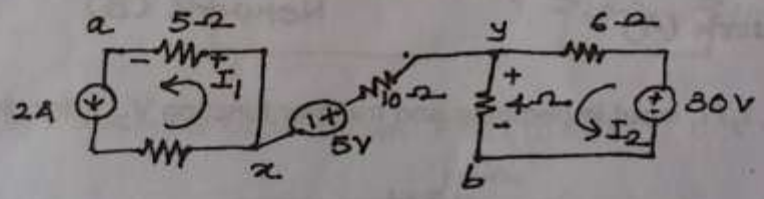


(c) For a given network switch K is closed and a steady state is reached in the network. 5

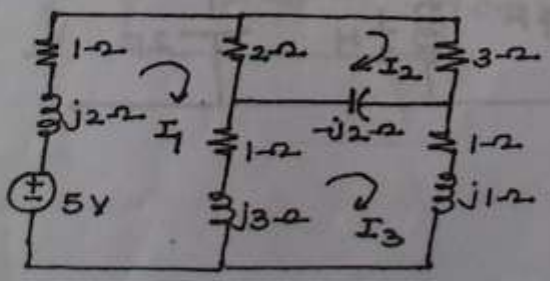
At t= 0, the switch is opened. Find $i(0^+)$, $V_c(0^+)$, $\frac{di}{dt}(0^+)$, $\frac{d^2i}{dt^2}(0^+)$



(d) Find the voltage V_{ab} in the network shown — 5



2. (a) Using mesh analysis find the voltage across the capacitor — 15



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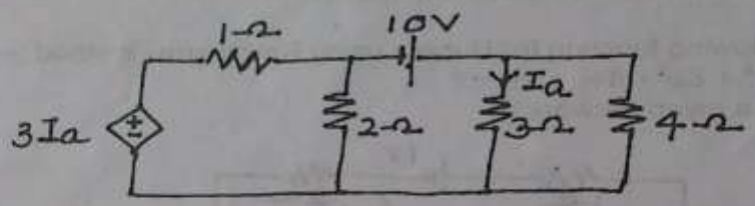
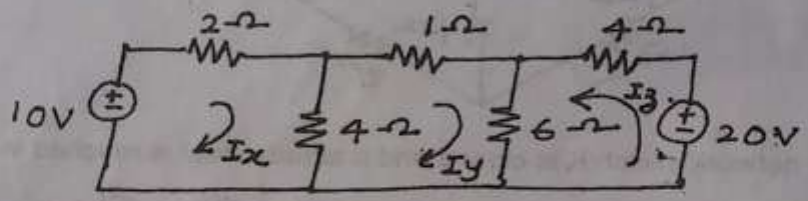
(b) Test the following functions for positive realness —

(i) $\frac{s^2 + 2s + 1}{s^2 + 4s + 4}$ (ii) $\frac{2s^2 + 2s + 1}{(s^2 + 1)^2}$

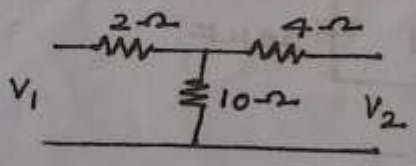
3. (a) Find the current through 4 Ω resistance using Thevenin's theorem —



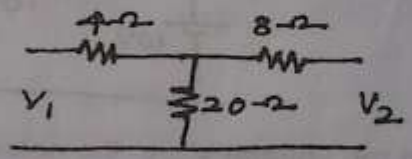
(b) Using graph theory find mesh currents Ix, Iy and Iz —



4. (a) Find transmission parameters of the two networks A and B if they are connected in cascade —

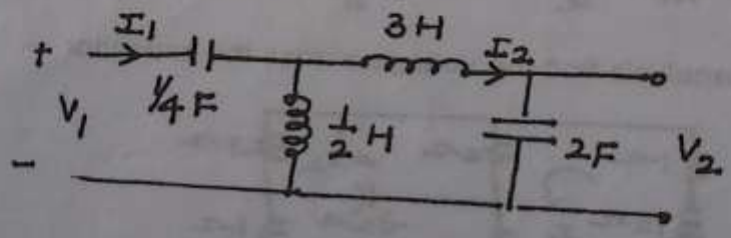


Network (A)



Network (B)

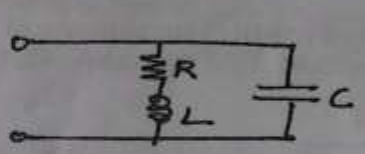
(b) Calculate V_2/V_1, I_2/I_1 input impedance and transfer function V_2/I_1 for given ladder network.

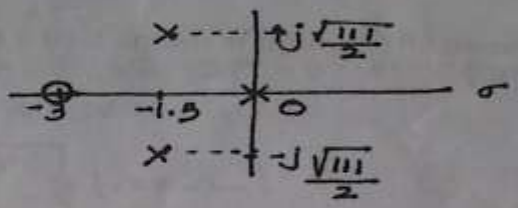


5. (a) The network shown below has the impedance form —

$$z(s) = \frac{K(s - z_1)}{(s - P_1)(s - P_2)}$$

If the poles and zeros of z(s) have the pole zero plot as shown in figure (b) with z(jo) = 1. Find values of R, L and C —



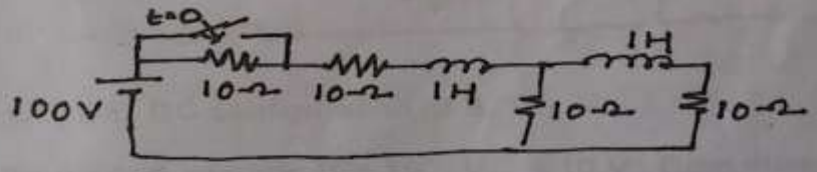


(b) (i) Define following terms :—
(1) Gain Margin
(2) Phase Margin
(3) Gain cross-over frequency.

(ii) Write short note on Significance of Initial Condition.

6. A designer requires the network with following data :—
(a) Impedance function has simple poles at –2 and –6
(b) It has simple zeros at –3 and –7
(c) z(0) = 20 Ω
Find Foster I, Cauer I and Cauer II forms.

7. (a) In the network shown below switch K is closed at t = 0, a steady state having previous existed. Find the current in the resistor R_3 using Laplace.



(b) If $i_L(0) = 10A$ in the circuit shown. Find $i_L(t)$ for $t > 0$.