S.E. sem 3 (Rev.) Etrx / Electrical Network Analysis and synthesis 13/6/08

Con. 2884-08. CO-9550

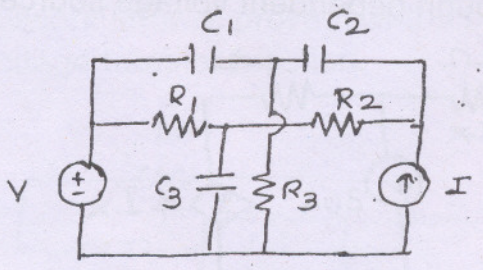
(REVISED COURSE)

(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. Attempt the following questions :—

(a) Construct the dual circuit for the circuit shown— 5

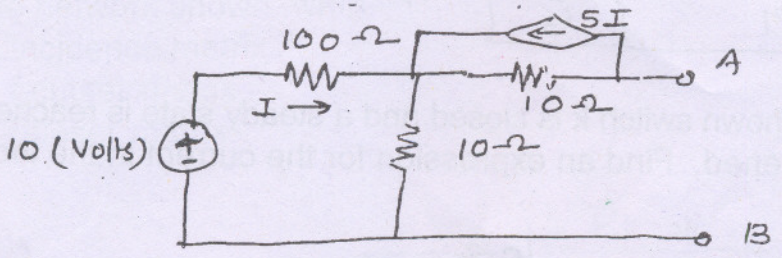


(b) Given— 5

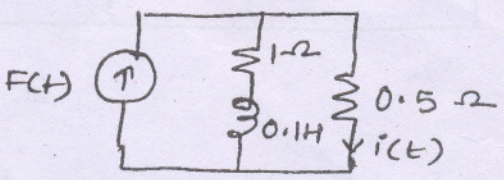
$$A = \begin{bmatrix} 0 & -1 & 1 & 0 & 0 \\ 0 & 0 & -1 & -1 & -1 \\ -1 & 0 & 0 & 0 & 1 \end{bmatrix}$$

Draw oriented graph and show one tree.

(c) Find Thevenin's equivalent circuit of following network across A – B. 5



(d) For the network shown, find transfer function which relates current i(t) with source current f(t). Also find poles and zeros of this transfer function. 5



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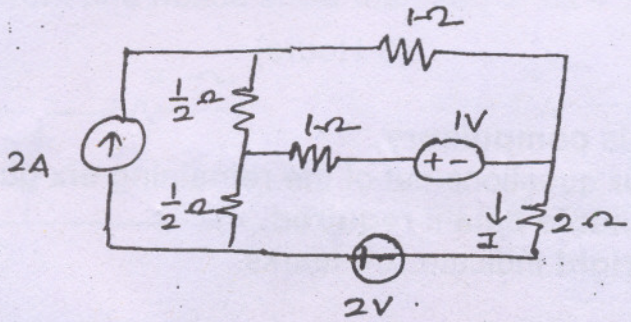
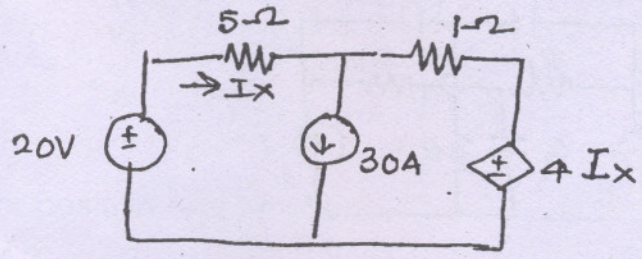
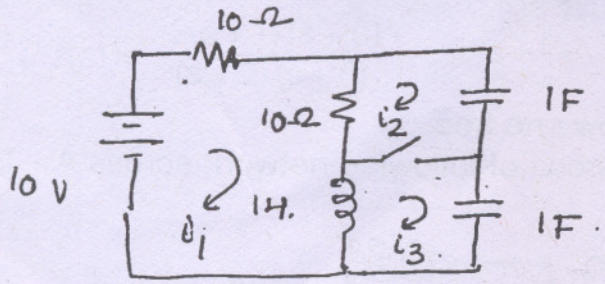
2. (a) Using source shifting and source transformation, find current I in the circuit. **10**



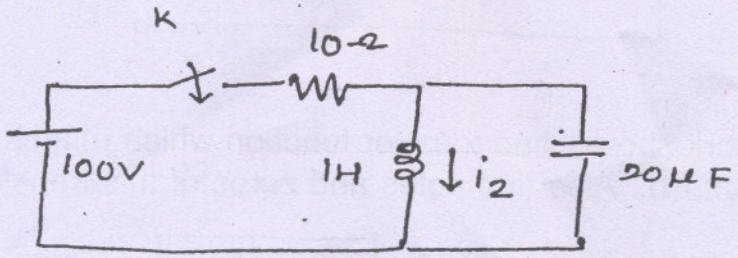
(b) Find current Ix by superposition principle. Hence find the voltage of independent voltage source and current through dependent voltage source. **10**



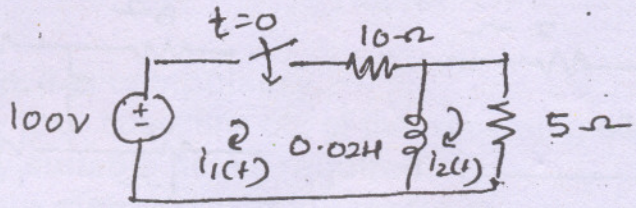
3. (a) The network shown attains steady state with the switch k open. At t = 0, switch is closed. Determine $i_1(0+)$, $i_2(0+)$, $i_3(0+)$. **10**



(b) In the network shown switch k is closed and a steady state is reached. At t = 0, the switch is opened. Find an expression for the current in the inductor, $i_2(t)$. **10**

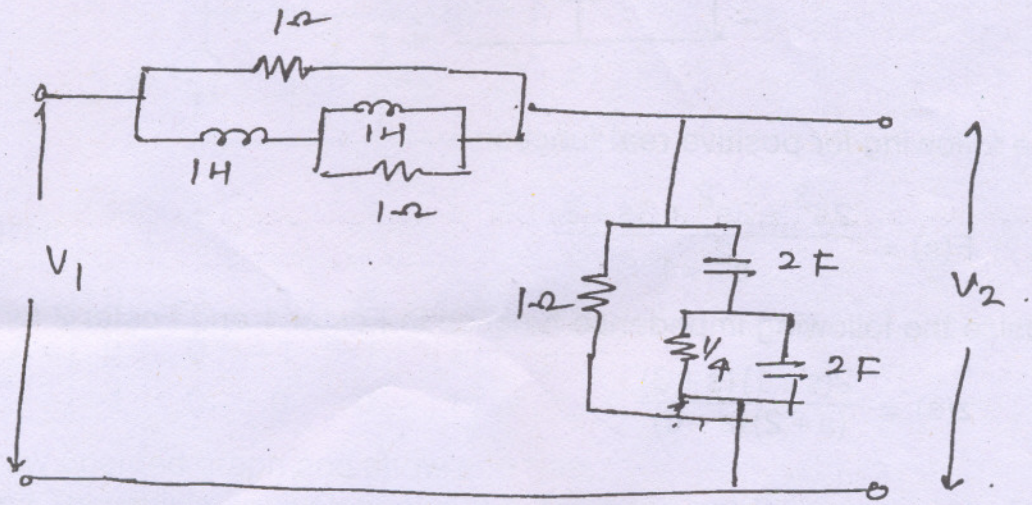


4. (a) Use a laplace transformation to find the current $i_1(t)$, $i_2(t)$ which results when the switch is closed at t = 0. **16**



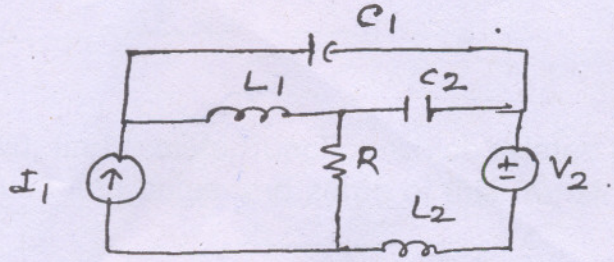
(b) Write short note on initial condition and its significance. **4**

5. (a) For the network shown, prove that the input impedance at port 1 is 1Ω. Also find the voltage transfer function. **10**

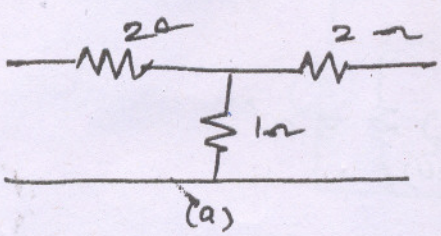


(b) For the network shown write— **10**

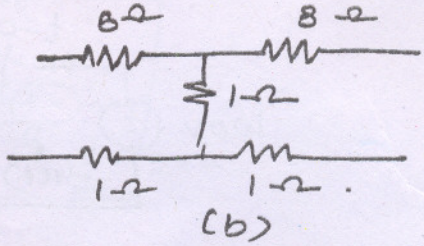
(i) Incidence matrix
(ii) f-cutset matrix
(iii) f-tieset matrix.



6. (a) Two network 'a' and 'b' shown in **figure** are connected in series. find z-prameter of equivalent network and hence show than zeq ≠ za + zb why ? **12**

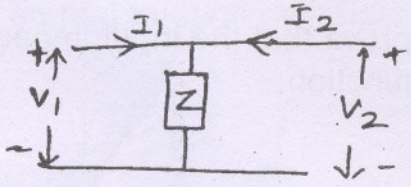


(a)



(b)

(b) For the network, determine transmission parameters. **8**



7. (a) Test the following for positive real function— **10**

$$F(s) = \frac{2s^3 + 2s^2 + 3s + 2}{s^2 + 1}$$

(b) Synthesize the following impedance function in Foster 1 and Foster 2 form— **10**

$$z(s) = \frac{2(s+1)(s+3)}{(s+2)(s+6)}.$$

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