Sem III / Rev / Inst / Electrical Networks / Dec-09

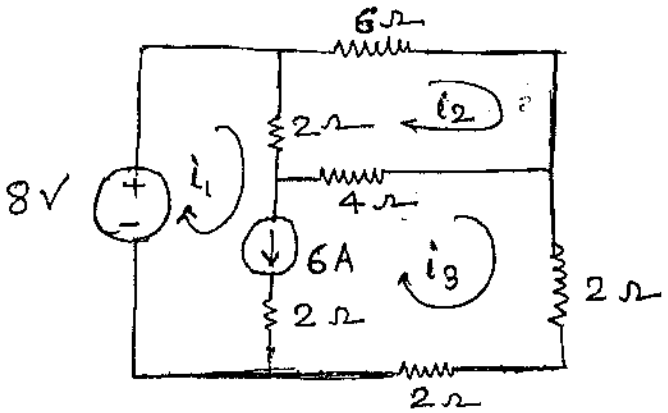
Con. 6014–09. **(REVISED COURSE)** **SP–7379**

(3 Hours) **[Total Marks : 100**

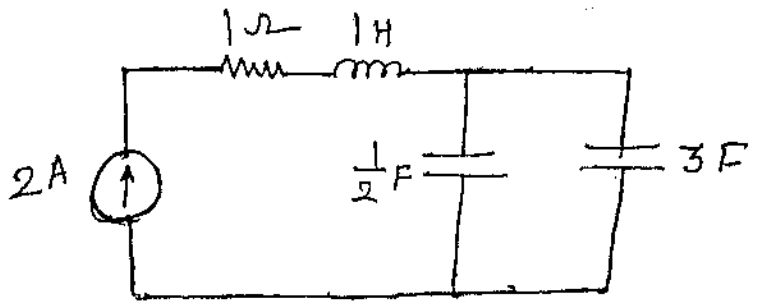
N.B. : (1) Question No. **1** is **compulsory.**
(2) Attempt any **four** questions out of **six** questions.
(3) **Figures** to the **right** indicate **full** marks.
(4) Assume **suitable** data if **required.**

1. Solve the following :– **20**

(a) For given network, find the current i_1, i_2 and i_3.

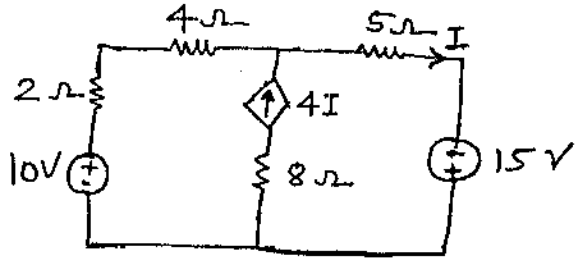


(b) Draw the dual network of the circuit shown in **figure**



(c) Find condition of symmetry in h-parameter and ABCD parameter.

(d) Find the current in all branches of network shown in **figure** and voltage across current source.



(e) Using relation $y = z^{-1}$, show that $|z| = \frac{1}{2}\left(\frac{z_{22}}{y_{11}} + \frac{z_{11}}{y_{22}}\right)$.

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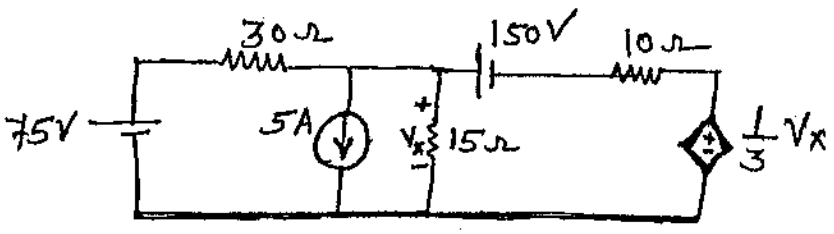
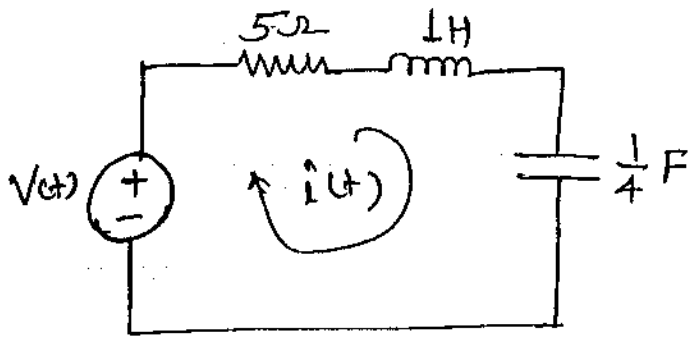
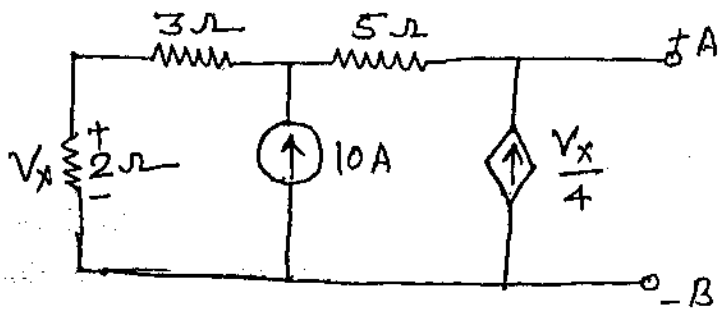
2. (a) Find Vx by using superposition theorem for network shown in **figure** – 10



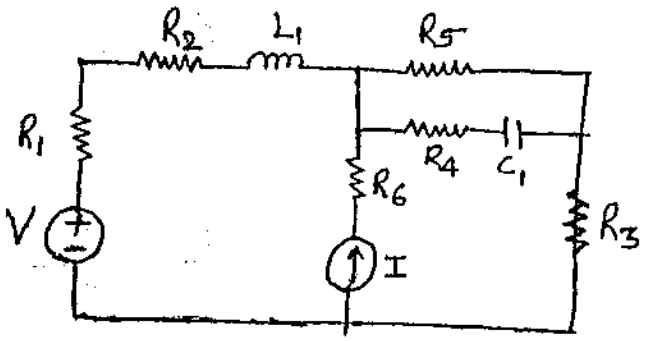
(b) Determine the current i(t) in a series RLC circuit shown in **figure**, when each of the following forces (voltages) is applied (i) Ramp Voltage 12 r (t – 2) and (ii) Step Voltage 3u (t – 2). Assume that the circuit was initially relaxed. Use Laplace transform method. 10



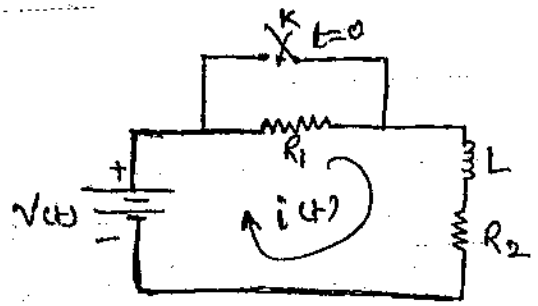
3. (a) Draw the Thevenin's equivalent network for circuit shown in **figure** below – 10



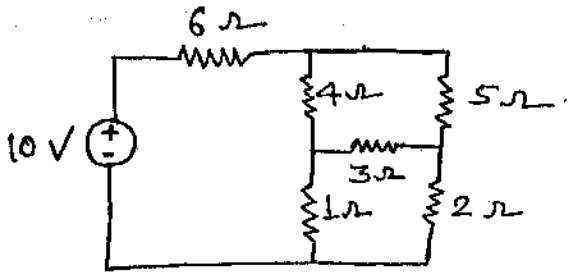
(b) For the circuit shown in **figure**, write incidence matrix, fundamental cutset matrix and fundamental tieset matrix. 10



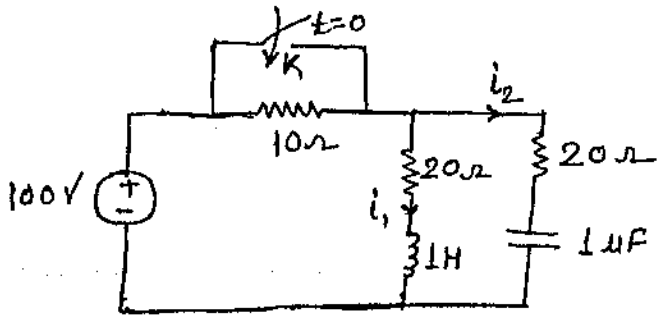
4. (a) In the given circuit, switch 'K' is closed at time t = 0, the steady state condition having reached previously. Obtain an expression for the current in the circuit at any time t. If $R_1 = R_2 = 100$ ohms, V = 10 volts and L = 1 henry, calculate at time t = 5 millisecond – (i) current i (ii) voltage drop across R_2 and (iii) voltage across L. **10**



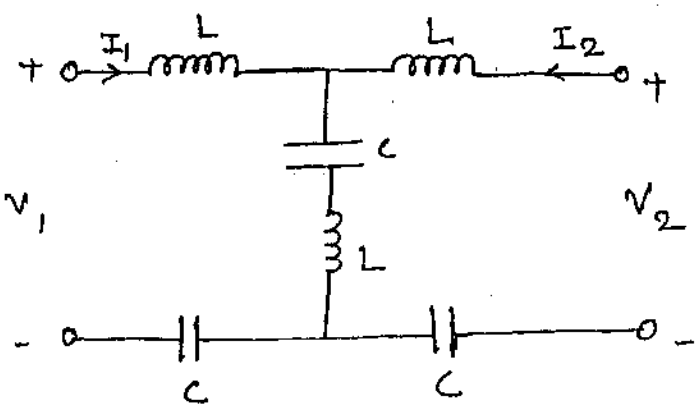
(b) For the network shown in **figure**, draw the linear graph and write equilibrium equation for KVL. Also find the loop currents. **10**



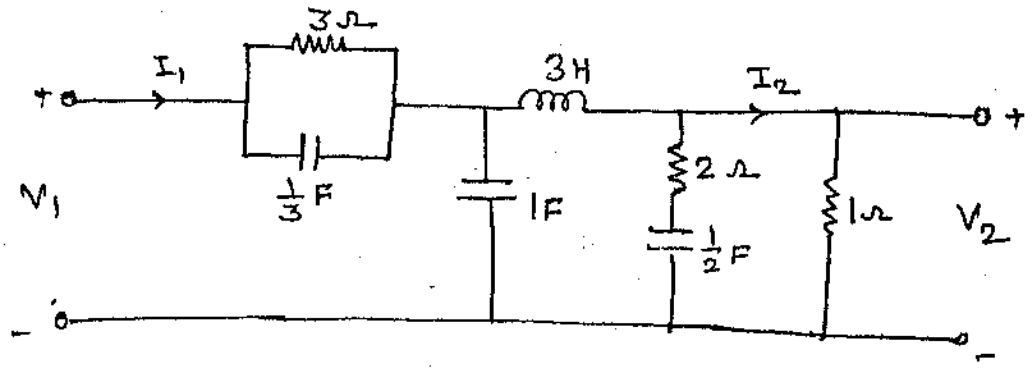
5. (a) Determine $V_c(0^+)$, $i_1(0^+)$, $\frac{di_1}{dt}(0^+)$ and $\frac{d^2i_2}{dt^2}(0^+)$ for the circuit shown in **figure**. Assume zero initial conditions. **10**



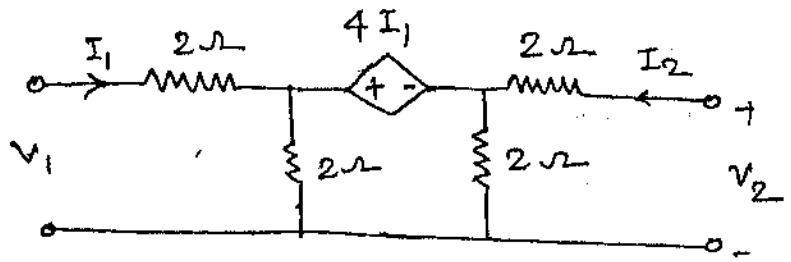
(b) Find z parameter by using interconnection relation. **10**



6. (a) Determine the voltage ratio $\frac{V_2}{V_1}$, current ratio $\frac{I_2}{I_1}$, transfer impedance $\frac{V_2}{I_1}$ and driving point impedance $\frac{V_1}{I_1}$ for the network shown in **figure** – **10**



(b) Find z and h parameter for the network shown in **figure** – **10**



7. (a) (i) Test whether the given polynomial is Hurwitz or not **5**

$F(s) = s^7 + 2s^6 + 2s^5 + s^4 + 4s^3 + 8s^2 + 8s + 4$

(ii) Check whether $F(s) = \frac{s+2}{s^2+3s+2}$ is positive real function. **5**

(b) Synthesize the following functions :– **10**

(i) $Z(s) = \frac{s^3+12s^2+32s}{s^2+7s+6}$ for Cauer II form

(ii) $Z(s) = \frac{(s^2+1)(s^2+3)}{s(s^2+2)(s^2+4)}$ for Foster II form.