

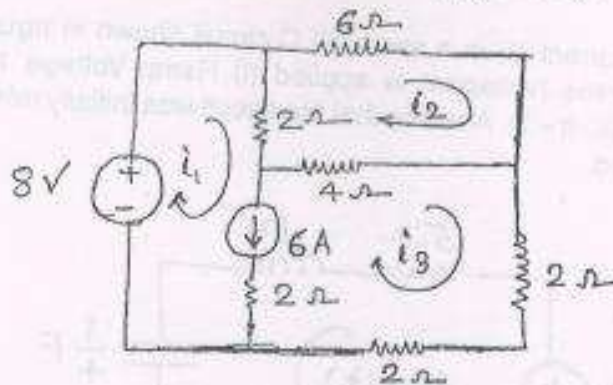


- N.B. : (1) Question No. 1 is compulsory.
 (2) Attempt any four questions out of six questions.
 (3) Figures to the right indicate full marks.
 (4) Assume suitable data if required.

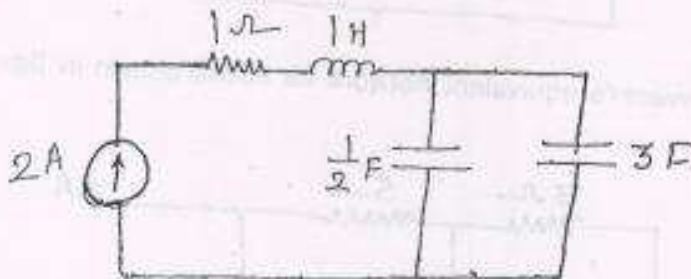
1. Solve the following :-

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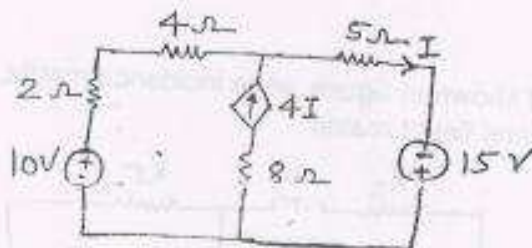
- (a) For given network, find the current i_1 , i_2 and i_3 .



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



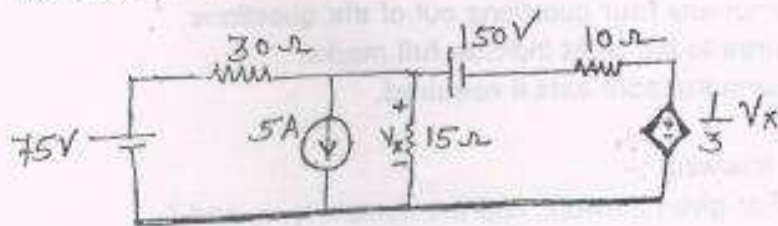
- (c) Find condition of symmetry in h-parameter and ABCD parameter.
 (d) Find the current in all branches of network shown in figure and voltage across current source.



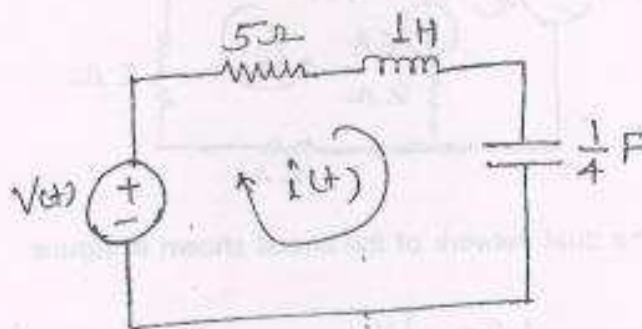
- (e) Using relation $y = z^{-1}$, show that $|Z| = \frac{1}{2} \left(\frac{z_{22}}{y_{11}} + \frac{z_{11}}{y_{22}} \right)$.

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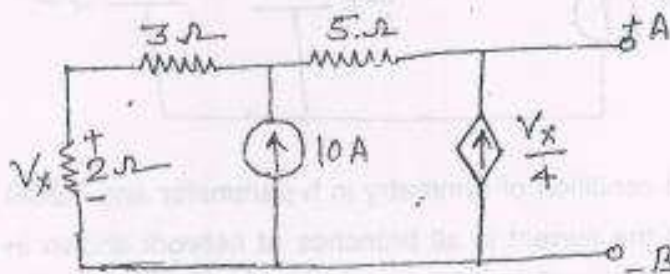
2. (a) Find V_x by using superposition theorem for network shown in figure - 10



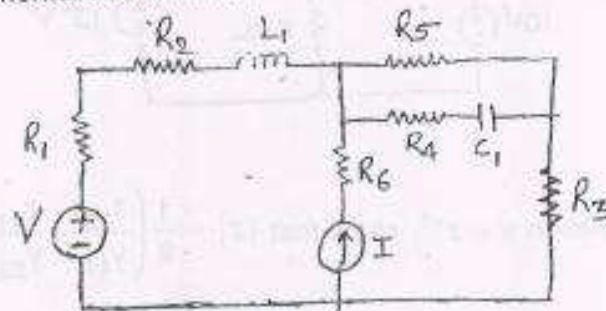
- (b) Determine the current $i(t)$ in a series RLC circuit shown in figure, when each of the following forces (voltages) is applied (i) Ramp Voltage $12t(t-2)$ and (ii) Step Voltage $3u(t-2)$. Assume that the circuit was initially relaxed. Use Laplace transform method. 10



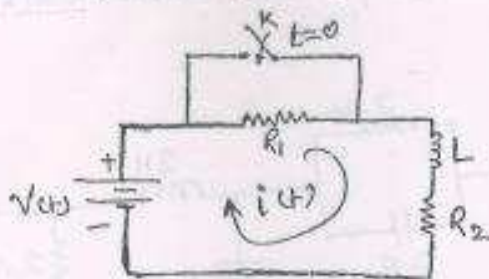
3. (a) Draw the Thevenin's equivalent network for circuit shown in figure below - 10



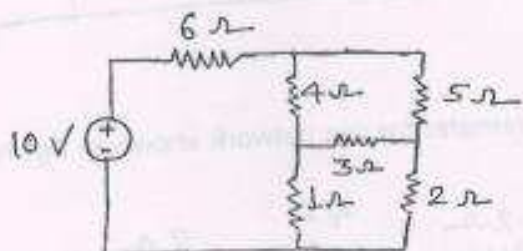
- (b) For the circuit shown in figure, write incidence matrix, fundamental cutset matrix and fundamental tieset matrix. 10



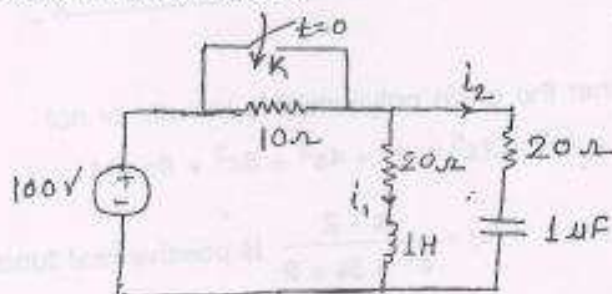
4. (a) In the given circuit, switch 'K' is closed at time $t = 0$, the steady state condition having reached previously. Obtain an expression for the current in the circuit at any time t . If $R_1 = R_2 = 100$ ohms, $V = 10$ volts and $L = 1$ henry, calculate at time $t = 5$ millisecond - (i) current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



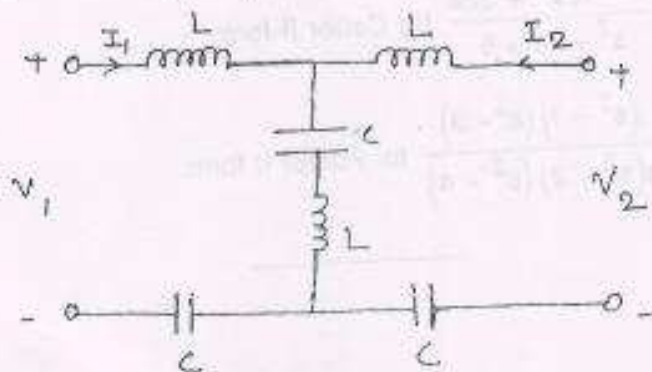
- (b) For the network shown in figure, draw the linear graph and write equilibrium equation for KVL. Also find the loop currents. 10



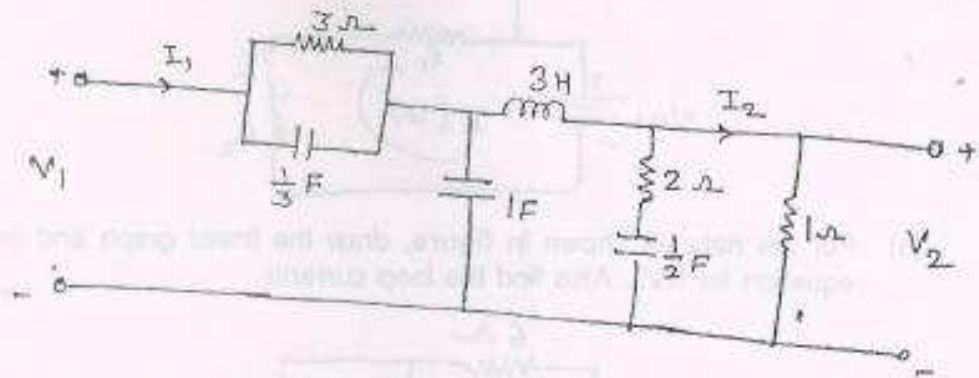
5. (a) Determine $V_c(0^+)$, $i_1(0^+)$, $\frac{di_1}{dt}(0^+)$ and $\frac{d^2i_2}{dt^2}(0^+)$ for the circuit shown in figure. 10
Assume zero initial conditions.



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

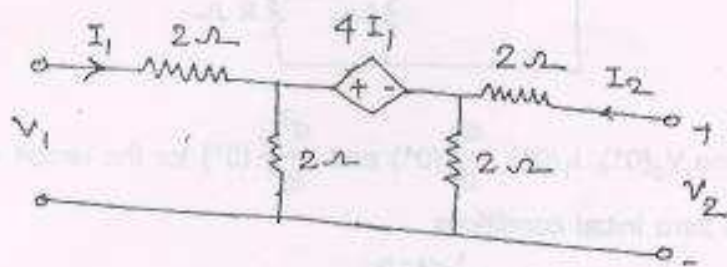


6. (a) Determine the voltage ratio $\frac{V_2}{V_1}$, current ratio $\frac{I_2}{I_1}$, transfer impedance $\frac{V_2}{I_1}$ and 10
driving point impedance $\frac{V_1}{I_1}$ for the network shown in figure -



- (b) Find z and h parameter for the network shown in figure -

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7. (a) (i) Test whether the given polynomial is Hurwitz or not
 $F(s) = s^7 + 2s^6 + 2s^5 + s^4 + 4s^3 + 8s^2 + 8s + 4$

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

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- (b) Synthesize the following functions :-

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(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.