Q. P. Code : 50743

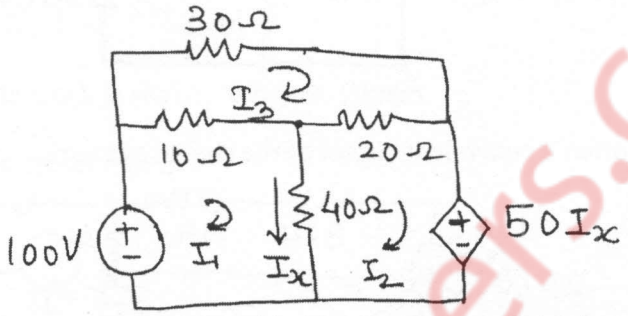
[Time: Three Hours] **[Marks:80]**

Please check whether you have got the right question paper.

N.B:
1. Question no. 1 is compulsory.
2. Solve any three questions from the remaining.
3. Assume suitable data wherever necessary.

Q.1 Attempt **any four**. **(20)**

(a) Find current through 20 Ω branch.



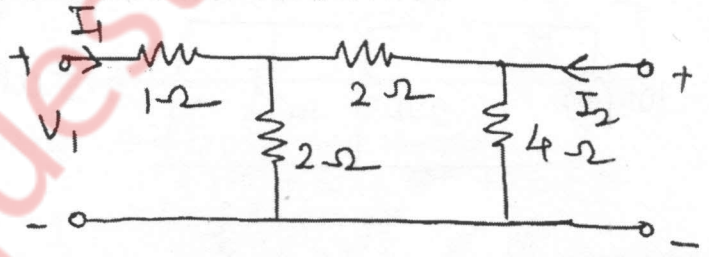
(b) Discuss the initial and steady state conditions in relationship with voltage and current for the following circuit elements.
i) Resistor ii) Inductor iii) Capacitor

(c) Draw the oriented graph of a network with f-cutset matrix as shown:

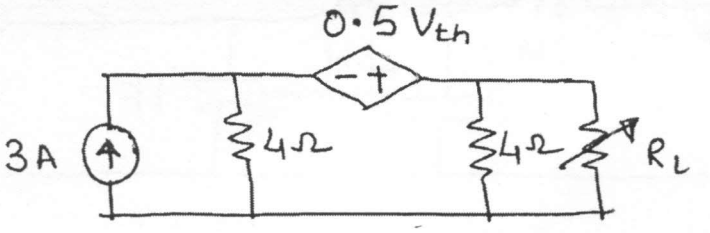
Twigs				links		
1	2	3	4	5	6	7
1	0	0	0	-1	0	0
0	1	0	0	1	0	1
0	0	1	0	0	1	1
0	0	0	1	0	1	0

(d) Write the properties of positive real function.

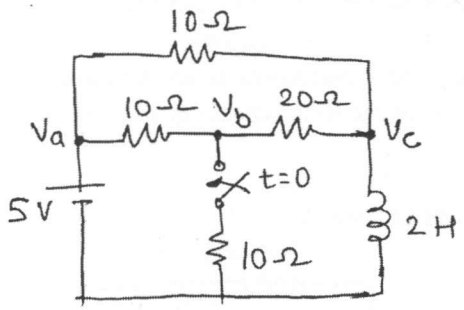
(e) Find Y-parameter for the shown network.



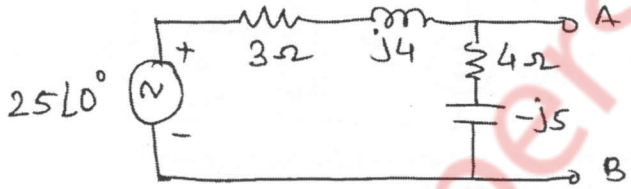
Q.2 (a) In the given network; what will be the value of R_L to get max. power delivered to it. **(10)**



(b) In the network shown; a steady state is reached with switch open. At t=0 the switch is closed. For the element values given; determine the $V_a(0^-)$ $V_b(0^-)$ and $V_a(0^+)$ and $V_b(0^+)$ **(10)**

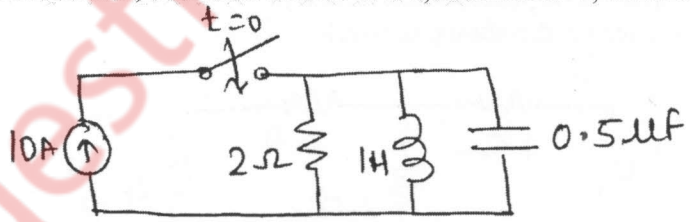


Q.3 (a) Obtain Norton's equivalent circuit of the shown network. **(05)**

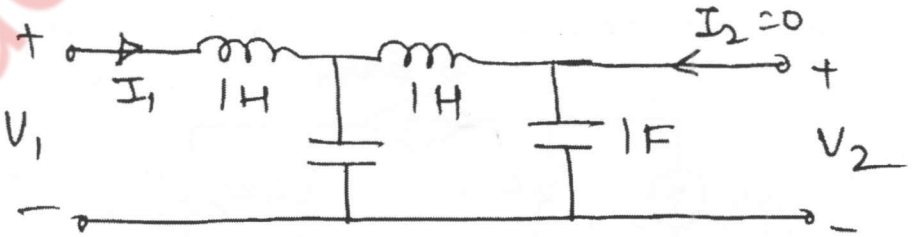


(b) Obtain thevenins equivalent source. **(05)**

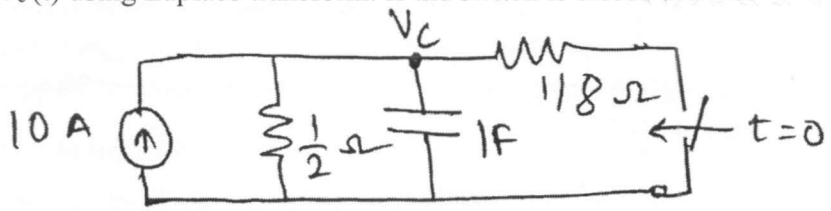
(c) For the shown network, switch is closed at t=0, determine V, dv/dt and d^2v/dt^2 at $t=0^+$ **(10)**



Q.4 (a) Find network functions $\frac{V_1}{I_1}$, $\frac{V_2}{I_1}$ and $\frac{V_2}{V_1}$ for the shown network **(10)**

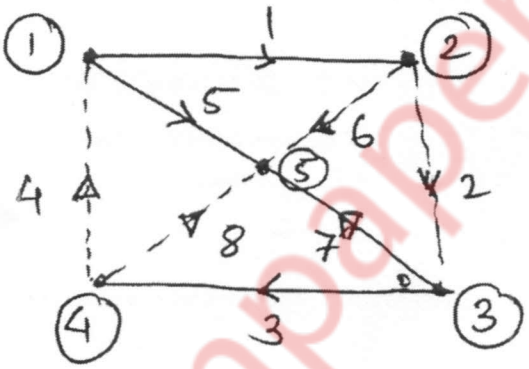


(b) Find V_c (t) using Laplace transform. If the switch is closed at t = 0. **(10)**

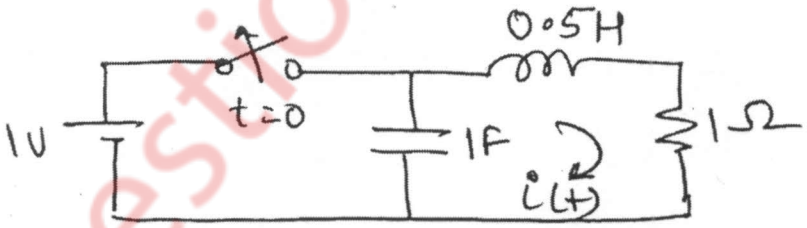


Q.5 (a) Linear graph of a network is shown in figure. Obtain **(10)**

i) Incidence matrix
ii) Fundamental cutset matrix
iii) Fundamental tieset matrix.



(b) In the network shown. Switch is opened at t = 0. Steady state condition is achieved before t = 0 find i (t). **(10)**



Q.6 (a) Check whether the following polynomials Hurwitz's or not. **(10)**

i) $P(s) = 2s^6 + s^5 + 135^4 + 6s^3 + 56s^2 + 25s + 25$
ii) $P(s) = s^4 + 7s^3 + 6s^2 + 21s + 8$

(b) Realize the Foster forms of the impedance function **(10)**

$$Z(s)\frac{4(s^2+1)(s^2+9)}{s(s^2+4)}$$

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