E Instrumentation sem III Rev Exam 08 May
Electrical Network 13/6/08

O-1618108.

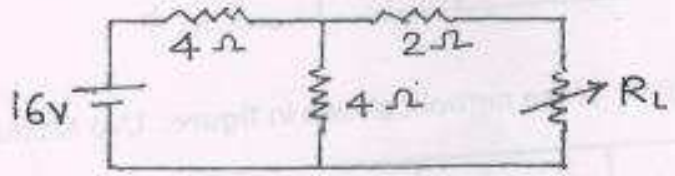
Con. 2651-08. (REVISED COURSE) CO-9580

(3 Hours) [Total Marks : 100

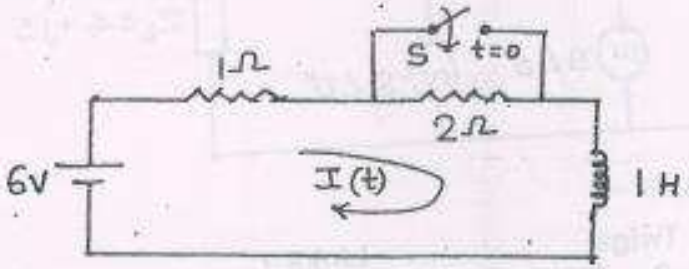
N.B. (1) Question No. 1 is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) Assume any **data if required**.
(4) **Figures** to the **right** indicate **full** marks.

1. Attempt any **five** :— 20

(a) Find R_L and P_{max} of the given circuit.



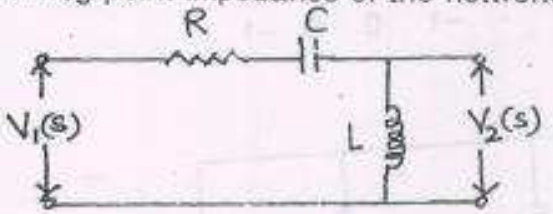
(b) When switch S is open, steady state is reached. When switch S closed at t = 0, find I(t) for t > 0.



(c) Find the final value of $F(s) = \frac{s+6}{s(s+3)}$. Check the result by solving it for f(t).

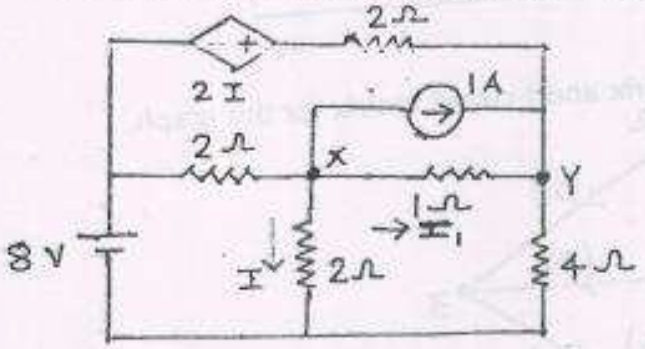
(d) Find condition for symmetry in Y-parameters.

(e) Find driving point impedance of the network.



(f) Write properties of R-C impedance function.

2. (a) Determine the current I and I_1 in the circuit shown in **figure** by using nodal analysis. 10



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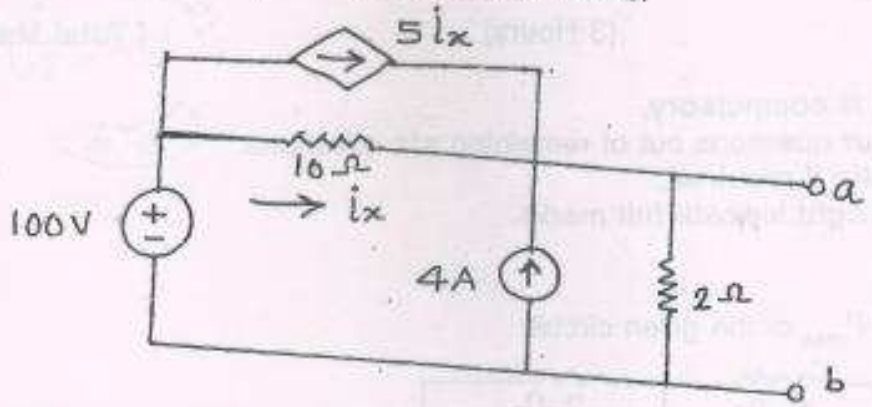
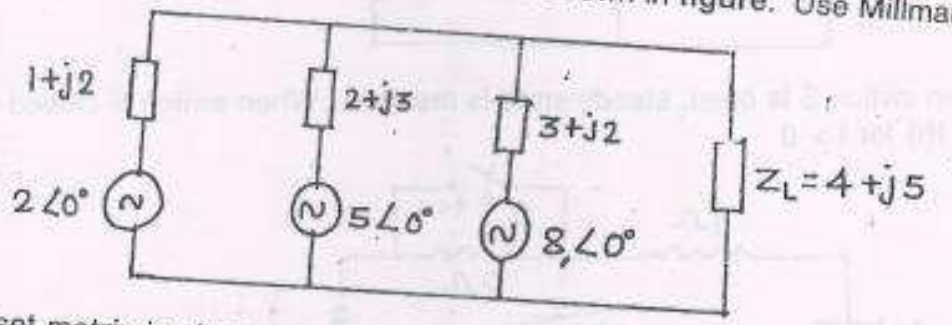
(b) Find Norton's equivalent circuit across a–b.



3. (a) Find the current through Z_L of the network shown in figure. Use Millman's theorem.

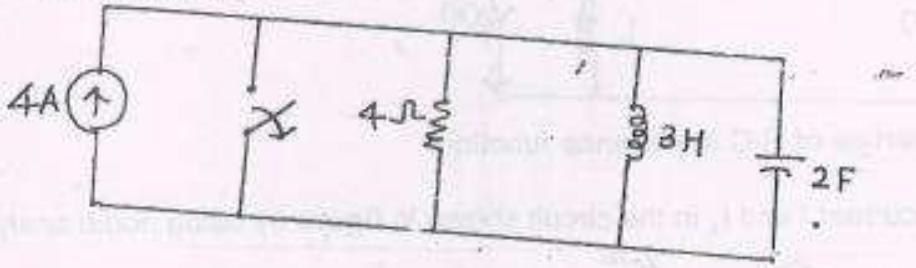


(b) F-cutset matrix is given as —

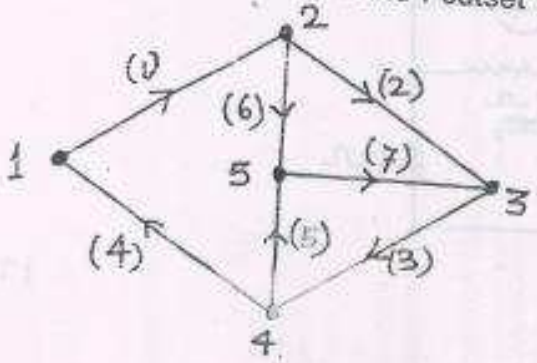
		Twigs				Links			
		1	2	3	4	5	6	7	8
Q =	1	1	0	0	0	1	1	0	0
	2	0	1	0	0	0	−1	−1	0
	3	0	0	1	0	0	0	1	1
	4	0	0	0	1	−1	0	0	−1

Draw oriented graph.

(c) Draw dual of network.



4. (a) Find incidence matrix, tie-set matrix and f-cutset matrix for the graph.



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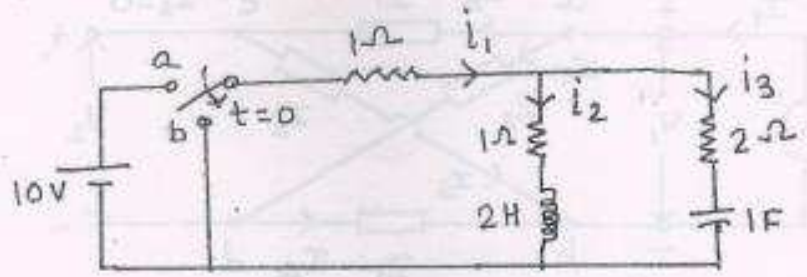
(b) Find $i_1(0+)$, $i_2(0+)$, $i_3(0+)$, $\frac{di_2}{dt}(0+)$ and $\frac{di_3}{dt}(0-)$. 10



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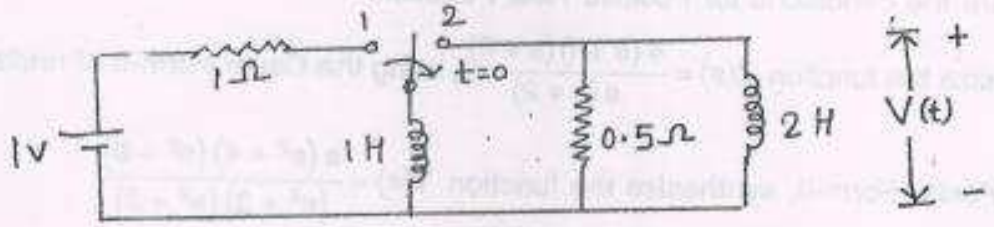
5. (a) Find V(t) for t > 0.



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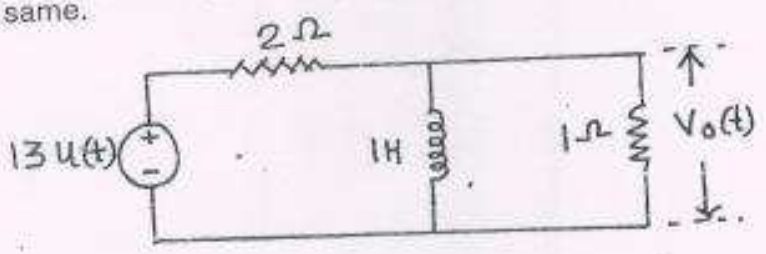
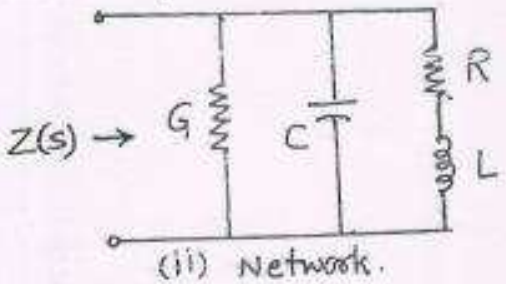
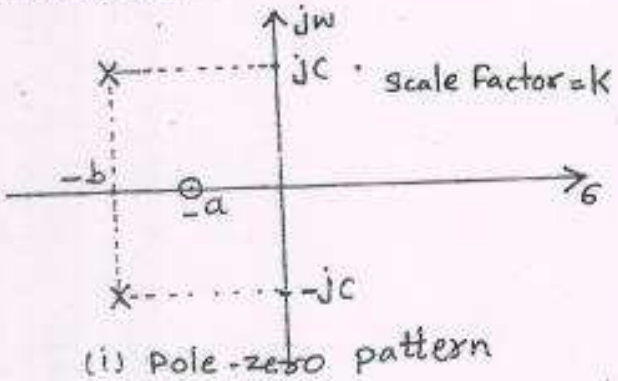
(b) (i) Find $V_0(t)$ in **figure**. Assume initial current to be 1A, and
(ii) Calculate $V_0(t)$ if the supply voltage becomes $5e^{-t}u(t)$. The initial condition remains the same.



6. (a) The pole-zero pattern for driving point impedance of a network and given network are shown in **figures (i) and (ii)** respectively. Determine an expression for Z(s) and find parameters R, L, G and C as functions of a, b and c if Z(0) = 1. 10



(ii) Network.



(i) Pole-zero pattern

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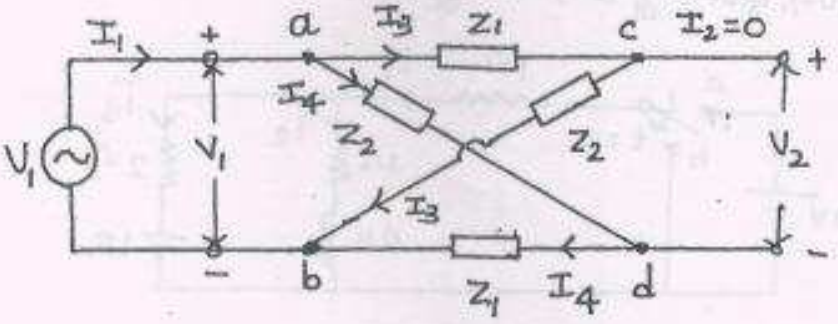
(b) Calculate the Z-parameters for the network. 10



7. (a) Express Z-parameters in terms of Y-parameters. 5

(b) What are the conditions for Positive Real Function. 5

(c) Synthesize the function $Z(s) = \frac{4(s+1)(s+3)}{s(s+2)}$, using the Cauer Form-II of realization. 5

(d) Using Foster Form-II, synthesize the function $Y(s) = \frac{s(s^2+4)(s^2+6)}{(s^2+3)(s^2+5)}$. 5