

SE - Sem III (CBGS) Electronics - ckt Theory  
 Circuit Theory

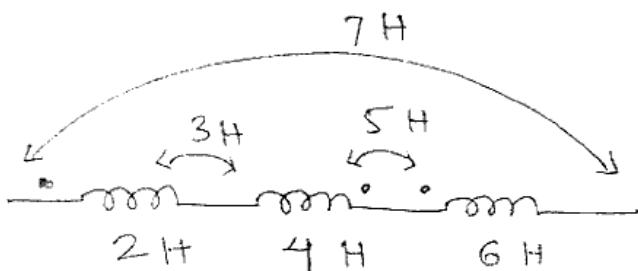
QP Code : 547600 16/12/16

(3 Hours)

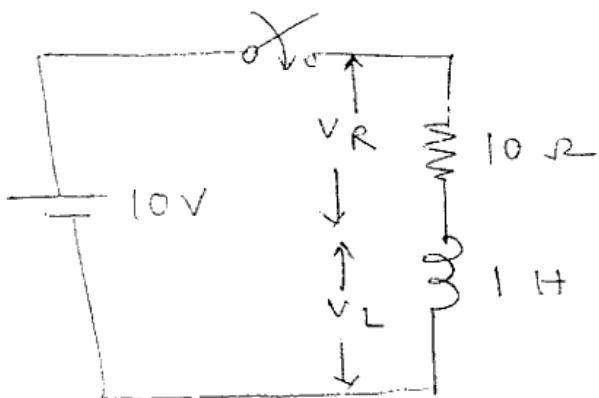
[ Total Marks : 80 ]

- N. B. : (1) Question No. 1 is **compulsory**.  
 (2) Solve any **three** questions out of remaining **five** questions.  
 (3) Figures to the **right** indicate full marks.  
 (4) Use Smith Chart for transmission line problem.

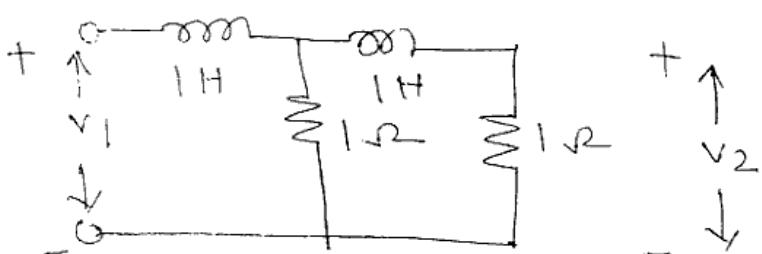
1. (a) Find the equivalent inductance of the network shown. 5



- (b) A series R-L circuit is shown in fig. has a constant voltage V applied at  $t = 0$ . At what time does  $V_R = V_L$  5



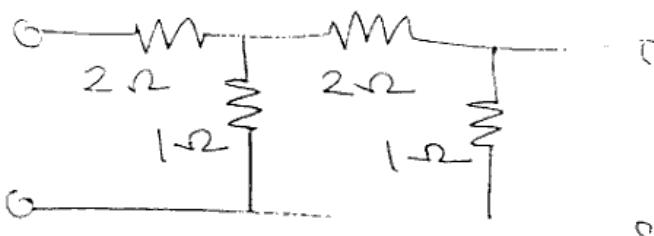
- (c) For the network shown plot poles and zeros of the transfer impedance function. 5



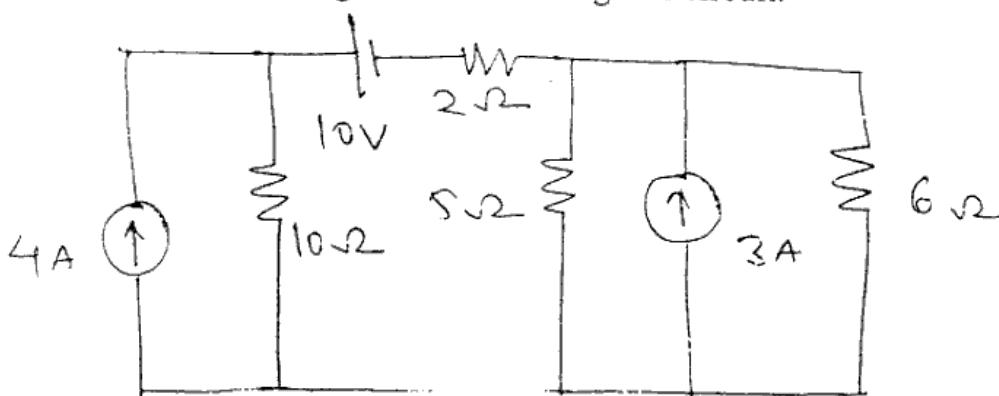
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- (d) Determine h parameters of the network given.

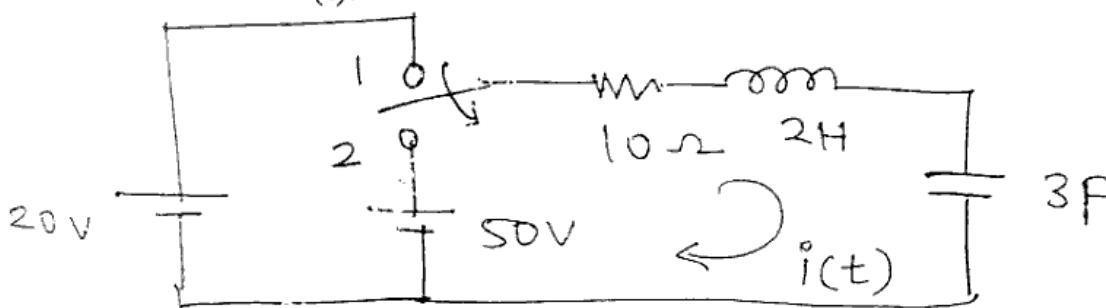


2. (a) Find the current through  $6\Omega$  resistor in given circuit.



10

- (b) In the network shown switch is moved from position 1 to position 2. The switch is at position 1 for long time. Determine the expression for the current  $i(t)$ .



10

3. (a) Test whether  $F(s) = \frac{2s^3 + 2s^2 + 3s + 2}{s^2 + 1}$  is a positive real function.

5

- (b) Check the whether the following polynomials are Hurwitz or not. Use continued fraction method.

3

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

2

$$(ii) P(s) = s^5 + s^3 + s$$

10

- (c) Realise caur forms of the following LC impedance function.

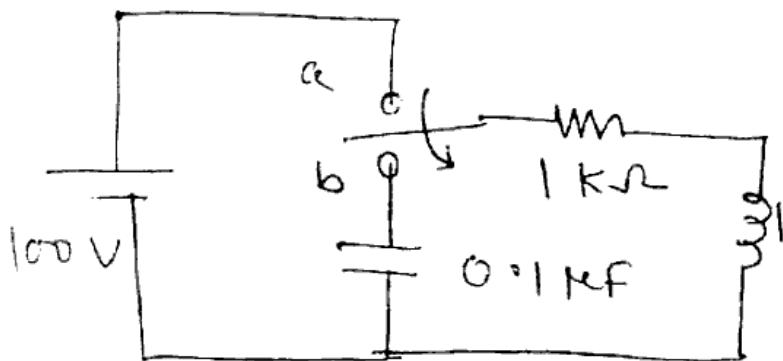
$$Z(s) = \frac{10s^4 + 12s^2 + 1}{2s^3 + 2s}$$

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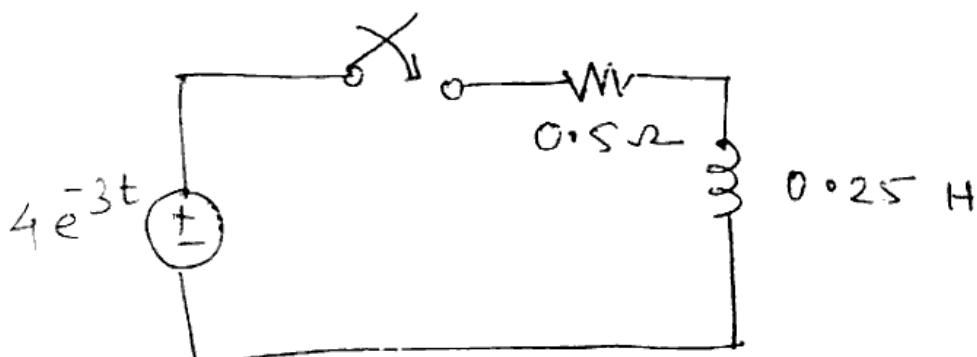
4. (a) In the network given the switch is changed from position a to b at 10

$t = 0$ . Find out  $i$ ,  $\frac{di}{dt}$  and  $\frac{d^2i}{dt^2}$  at  $t = 0^+$



- (b) The values of primary constants of an open wire line per km are  $R = 10\Omega$ ,  $L = 3.5 \text{ mH}$ ,  $C = 0.008 \mu\text{F}$  and  $G = 0.7 \mu\text{mho}$ . For a signal frequency of 1 KHz. Calculate  $z_0$ ,  $\gamma$ ,  $\alpha$ ,  $\beta$ ,  $\lambda$  and  $V_p$ . 10

5. (a) Find the expression for  $i(t)$ . 10



- (b) Design an m-derived T section high pass filter with a cut off frequency of 2 KHz. Design impedance of  $700\Omega$  and  $m = 0.6$ . 5

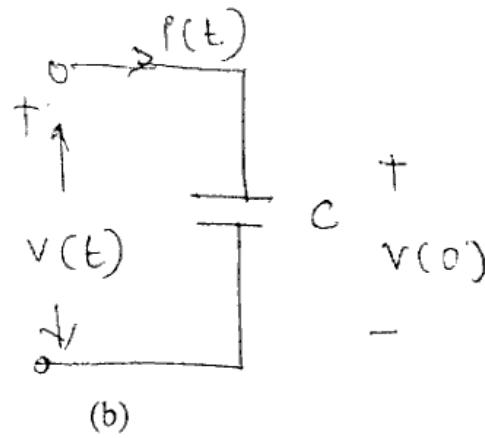
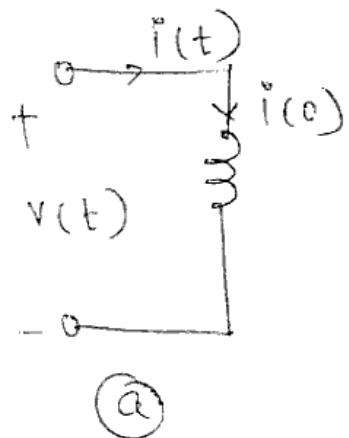
- (c) The char. impedance of a high frequency line is  $100\Omega$ . It is terminated in an impedance of  $100 + j100\Omega$ . Using Smith chart find the impedance at  $\frac{1}{8}$  wavelength away from the load end. 5

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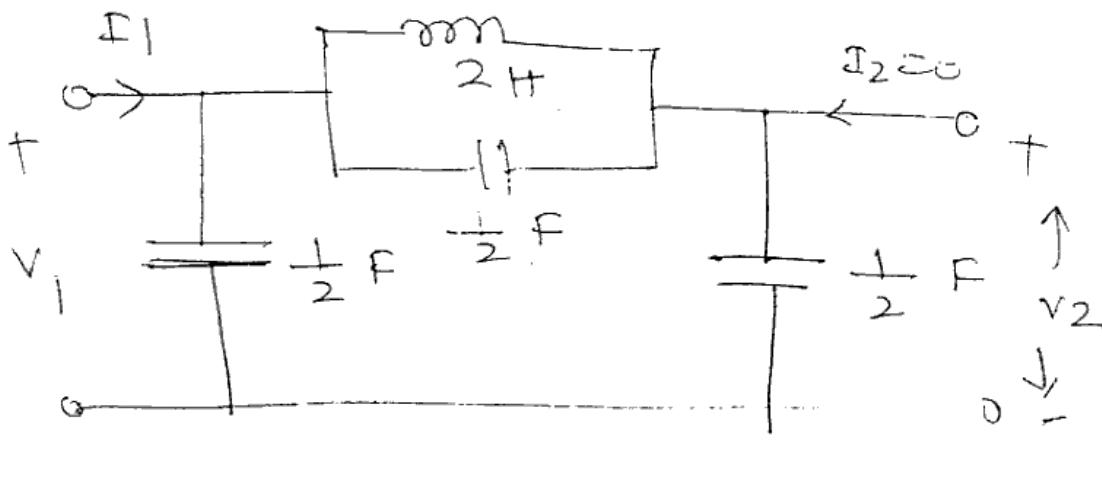
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6. (a) Draw and explain transformed network in s domain for given circuits. Use current and voltage equation. 5



- (b) A series RLC circuit has a quality factor of 5 at 50 rad/sec. The current flowing through the circuit at resonance is 10A and the supply voltage is 100V. Find the circuit constants.

- (c) For the given network determine  $\frac{V_2}{V_1}$  and  $\frac{V_2}{I_1}$  10



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