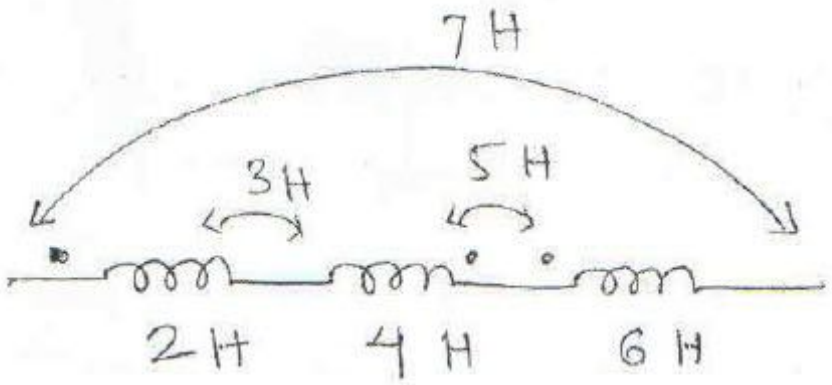
SE Electronics SEM-III (CBSGS) 16/12/2016
Circuit Theory

QP Code : 547600

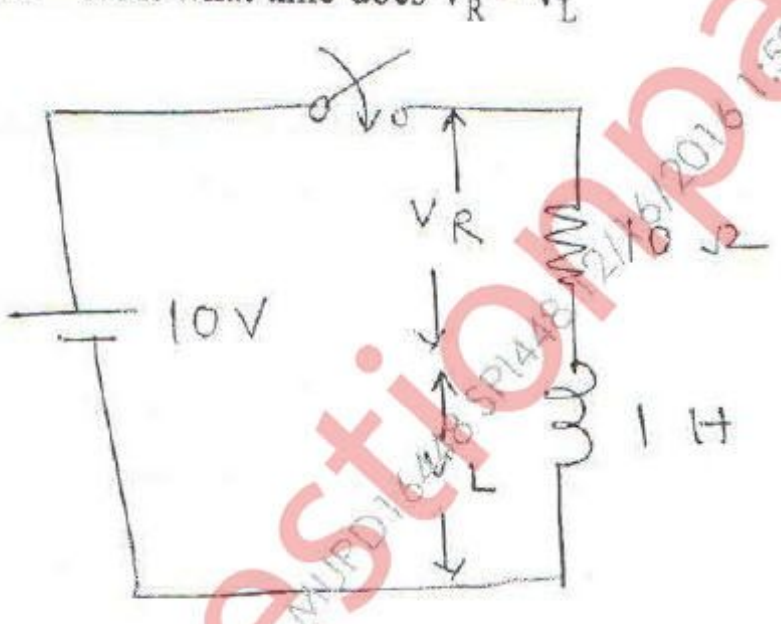
(3 Hours) **[Total Marks : 80**

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.

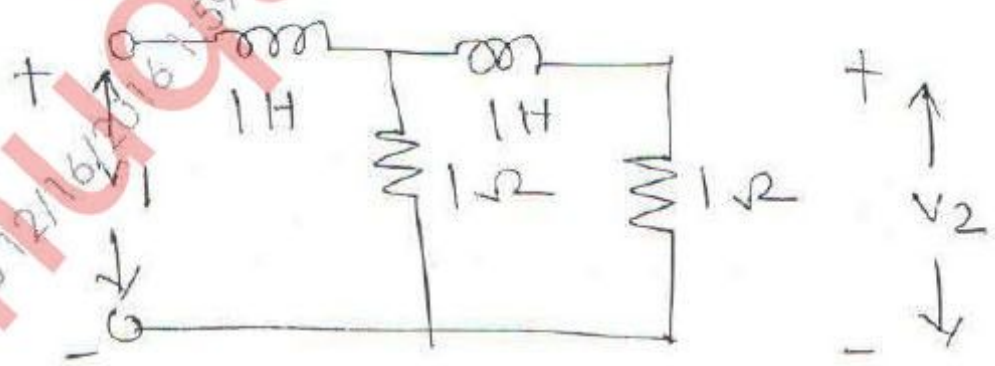
1. (a) Find the equivalent inductance of the network shown. **5**



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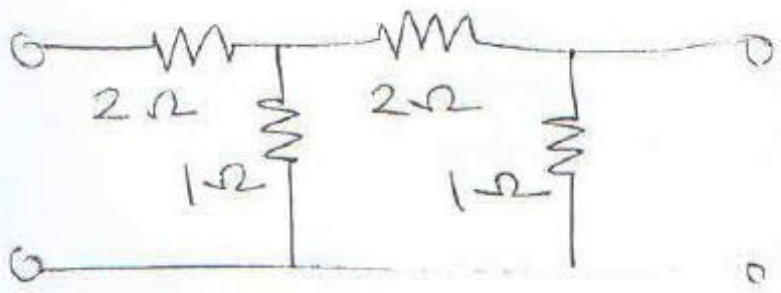
(d) Determine h parameters of the network given.



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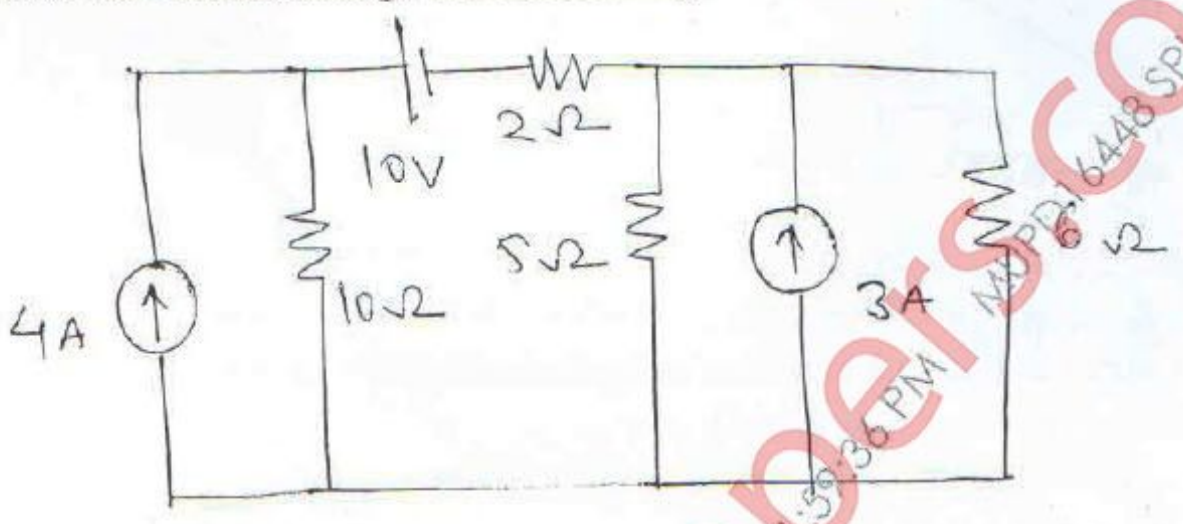
2. (a) Find the current through 6Ω resistor in given circuit.



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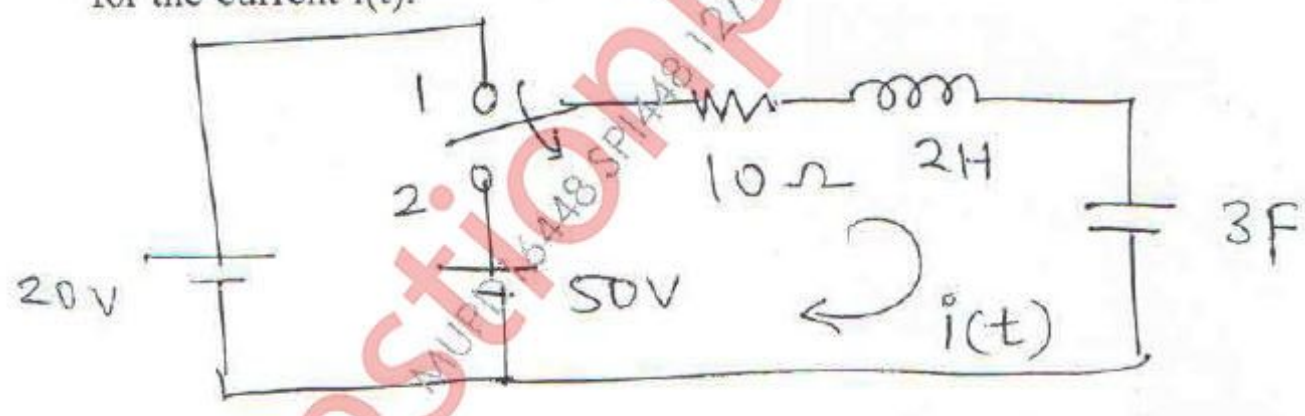
(b) In the network shown switch is moved from position 1 to position 2. The switch is at position 1 for long time. Determine the expression for the current i(t).



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

(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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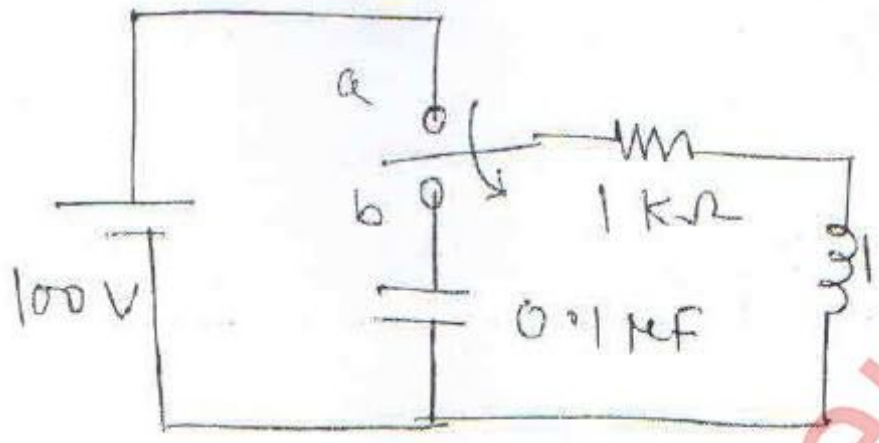
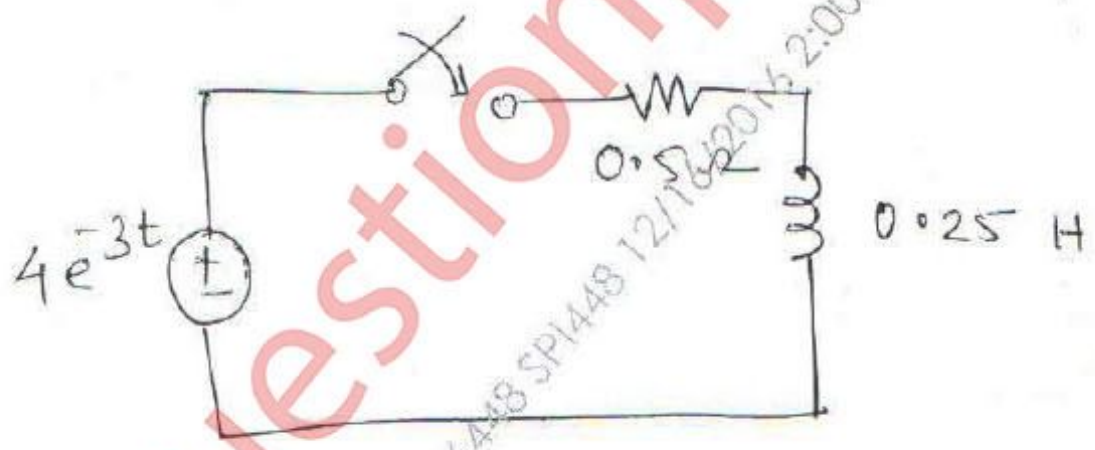
4. (a) In the network given the switch is changed from position a to b at t = 0. Find out i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$ **10**



(b) The volves of primary constants of an open wire line per km are R = 10Ω , L = 3.5 mH C = 0.008 μF and G = 0.7 μmho. For a signal frequency of 1 KHz. Calculate z_0, Υ, α, β, λ and V_p. **10**

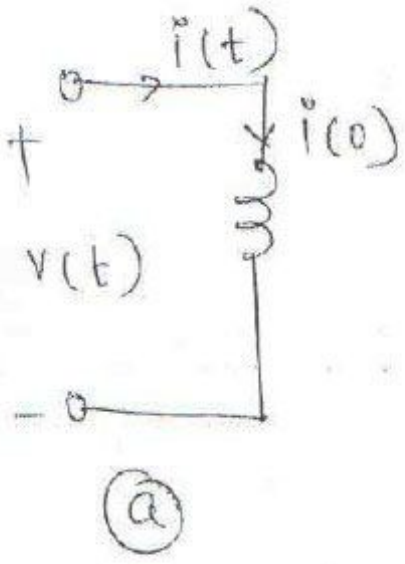
5. (a) Find the expression for i(t). **10**

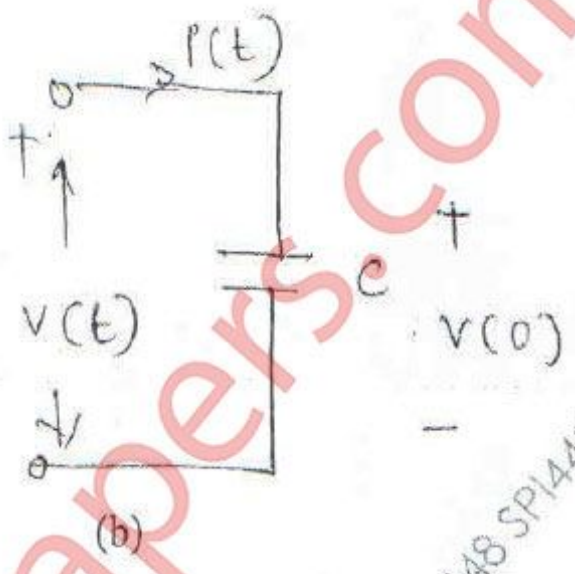


(b) Design an m-derived T section high pass filter with a cut off frequency of 2 KHz. Design impedance of 700Ω and m = 0.6. **5**

(c) The cha. impedance of a high frequency line is 100Ω. It is terminated in an impedance of 100 + j100Ω. Using Smith chart find the impedance at $\frac{1}{8}$ th wavelength away from the load end. **5**

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. **5**

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