S.E / III / Electri N/w Analy^{S} & Synthesis / NST / 16-12-15

K.C.E. EXAM KARJAT, RAIGAD

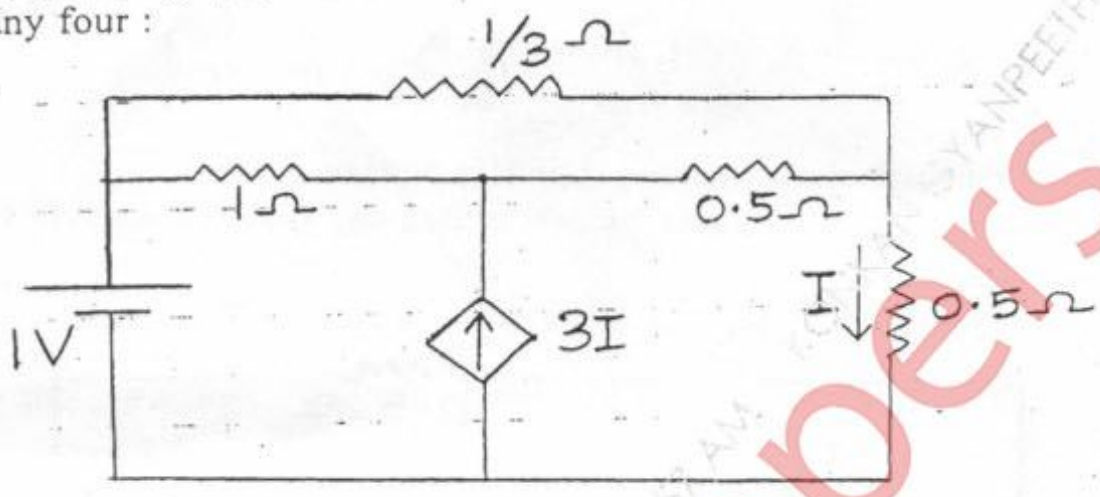
Q.P. Code : **5256**

(3 Hours) [Total Marks : 80

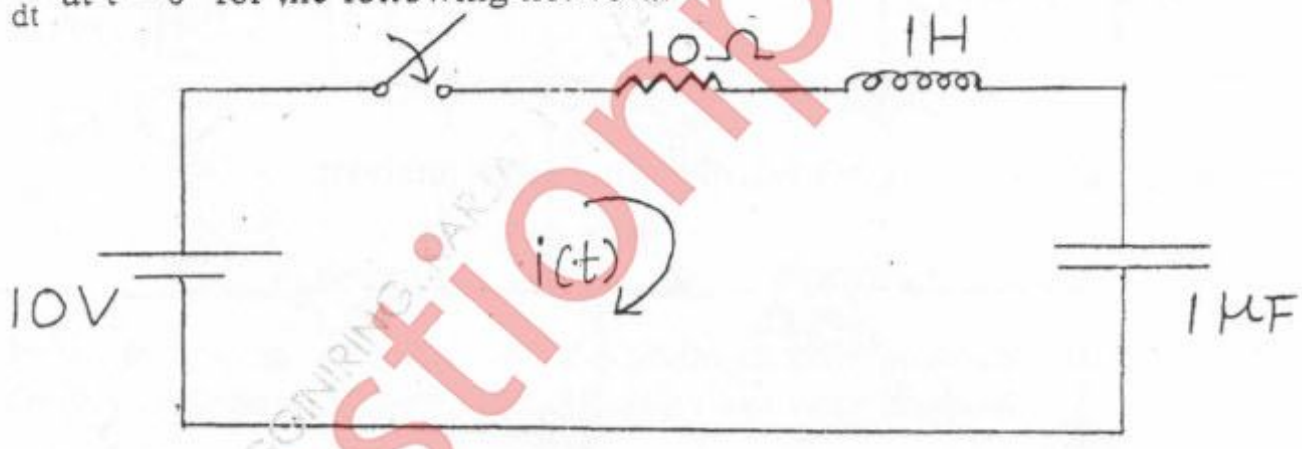
N.B. : (1) Question No.1 is compulsory.
(2) Answer any three out of remaining questions.
(3) Assumptions made should be clearly stated.

1. Attempt any four : 20

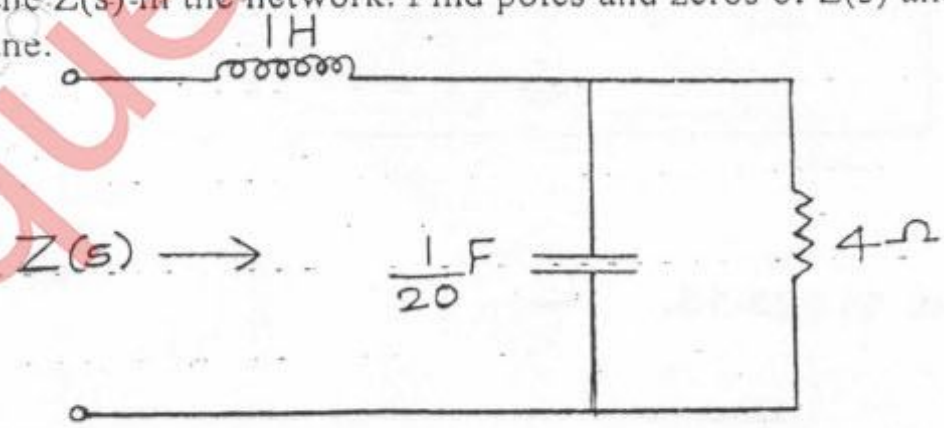
(a) Find V_s



(b) Switch is closed at t = 0. Assuming all initial conditions as zero, find i and $\frac{dt}{dt}$ at $t = 0^+$ for the following network.



(c) Determine Z(s) in the network. Find poles and zeros of Z(s) and plot them on s-plane.



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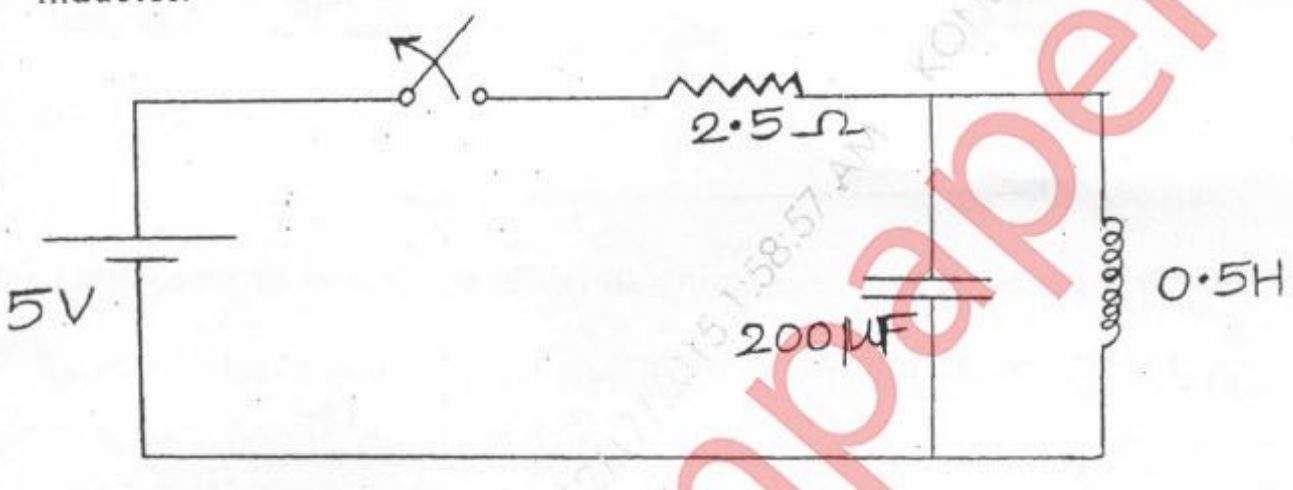
(d) Test whether the following polynomials are Hurwitz.

(i) $P(s) = s4 + s3 + 3s2 + 2x + 12$

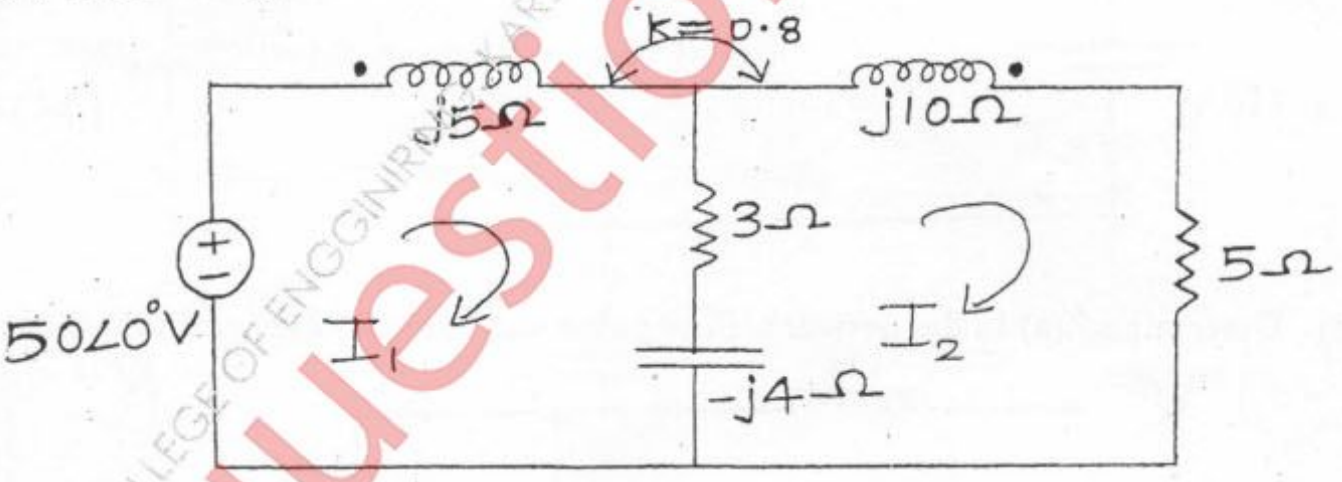
(ii) $P(s) = s4 + 7s3 + 6s2 + 21s + 8$

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

2. (a) Fr the network shown below, switch is opened at t = 0. If steady state is attained before switching, find the current through inductor.



(b) Find voltage across 5Ω resistor using mesh analysis.



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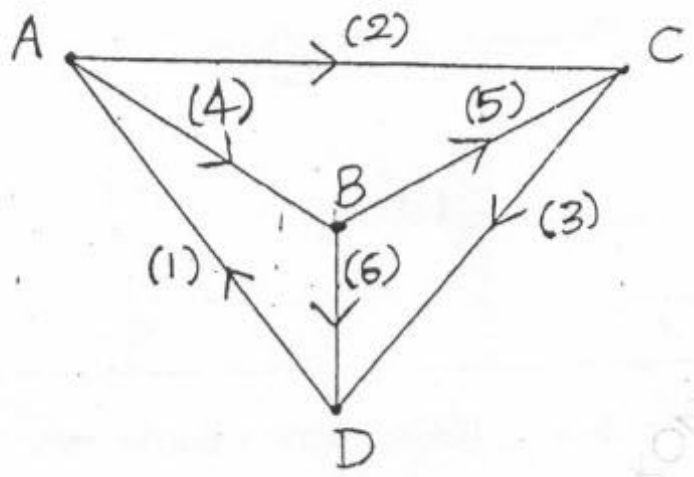
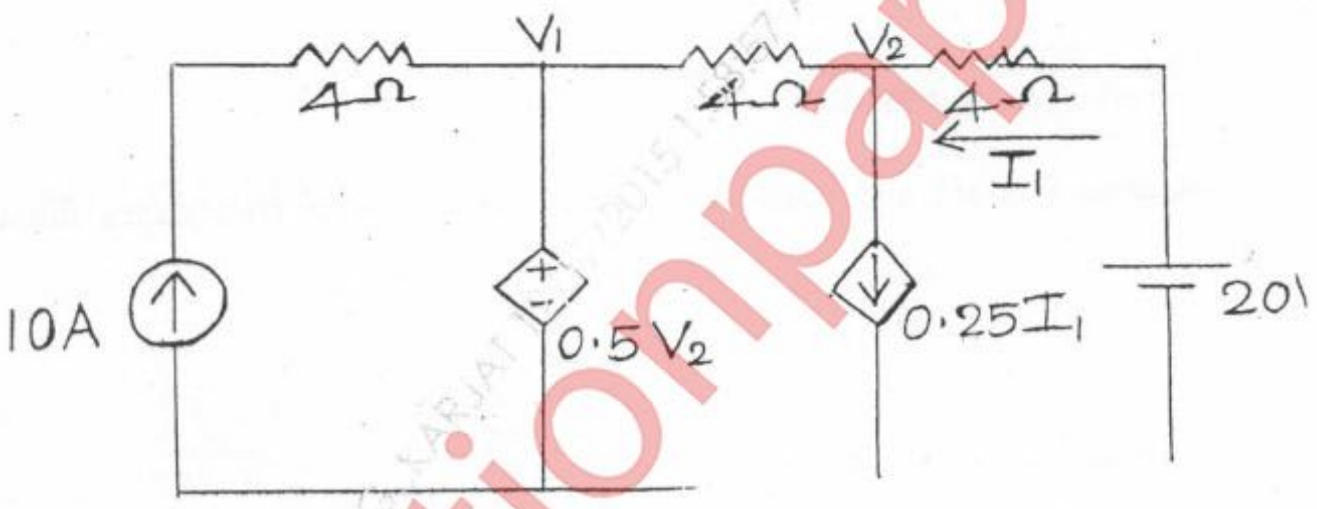
3. (a) For the following graph of the network, write.
(i) Incidence Matrix, (ii) Tieset Matrix and (iii) Cutset Matrix

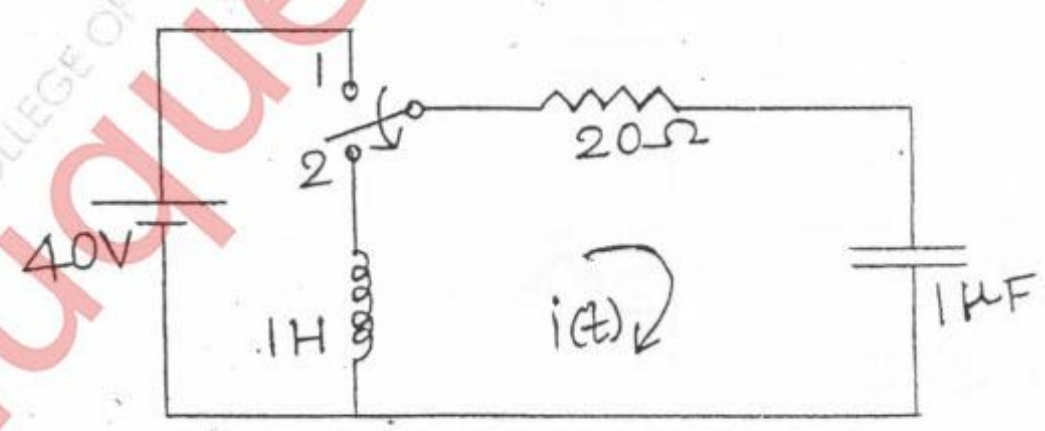


(b) Using Superposition Theorem, determine the voltages V_1 and V_2.



4. (a) In the following network, switch is changed from position 1 to 2 at t = 0. Before switching, steady state condition has been attained.

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



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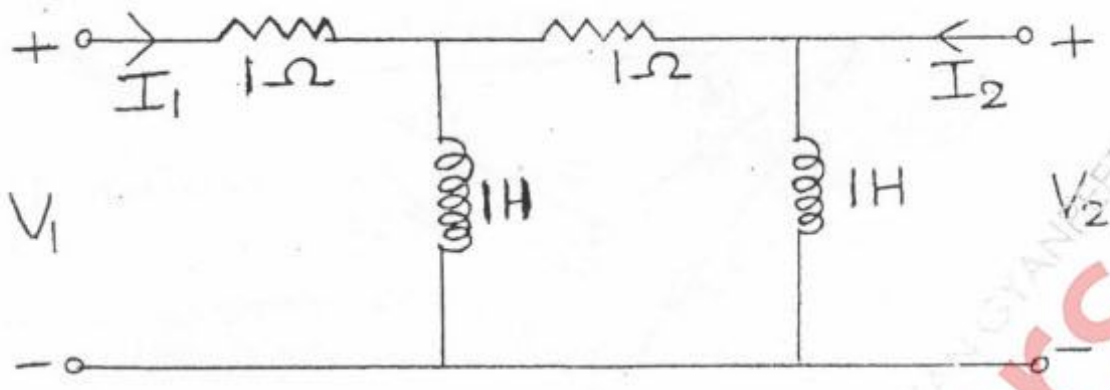
(b) Find Z parameters for the network.



5. (a) Test whether the following functions are positive real.

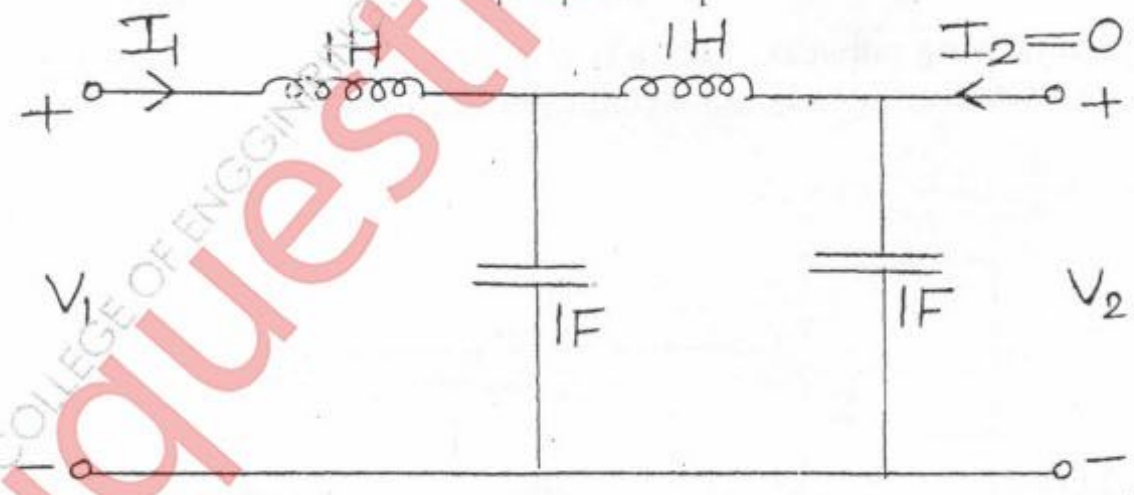
(i) $F(x)=\dfrac{s^2+6x+5}{x^2+9s+14}$

(ii) $F(s)=\dfrac{s^2+1}{s^3+4s}$

(b) Realize Foster I and Foster II forms of the following impedance function.

$$Z(s)\frac{\left(s^2+1\right)\left(s^2+3\right)}{s\left(s^2+2\right)}$$

6. (a) Find th enetwork functions $\frac{V_1}{I_1}; \frac{V_2}{V_1}$ and $\frac{V_1}{I_1}$



(b) Find Cauer I and Cauer II forms of RL impedance function.

$$Z(s)=\frac{2(s+1)(s+3)}{(s+2)(s+6)}$$

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