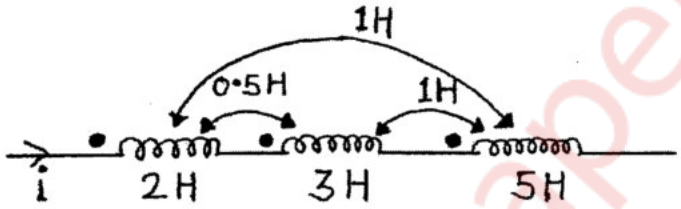
(3 Hours) **Total Marks: 80**

N.B: (1) Question **No. 1** is compulsory.
(2) Attempt any **three questions** from the remaining.
(3) Figures to the right indicate full marks.
(4)Assume suitable data if required.

Q.1) (a) Obtain Y parameters in terms of Z parameters. (5)

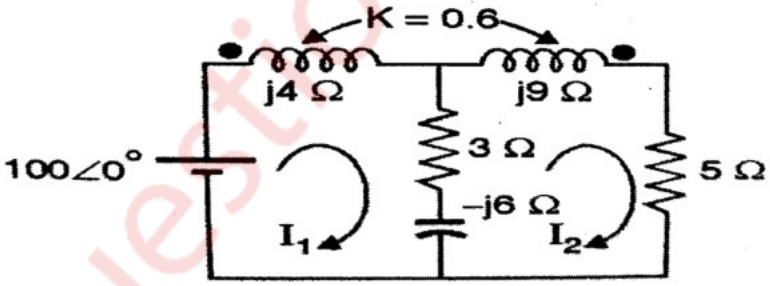
(b) Explain the properties of positive real functions. (5)

(c) Find the equivalent inductance of the network shown. (5)



(d) Explain various types of filters (5)

Q.2) (a) Find currents i_1 and i_2 in the given network using mesh analysis. (10)

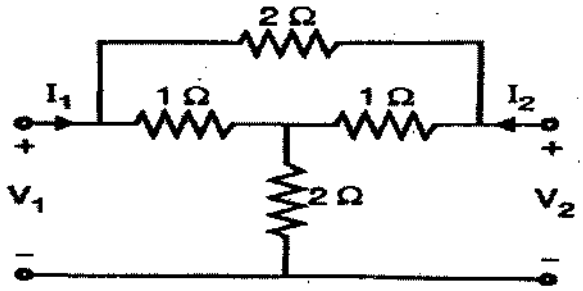


(b) Test whether the following functions are a positive real functions. (10)

(i) $F(S) = \frac{S^4+3S^3+S^2+S+2}{S^3+S^2+S+1}$ (ii) $F(S) = \frac{S^2+4}{S^3+3S^2+3S+1}$

TURN OVER

Q.3) (a) Determine Y parameter of the interconnected network. (10)

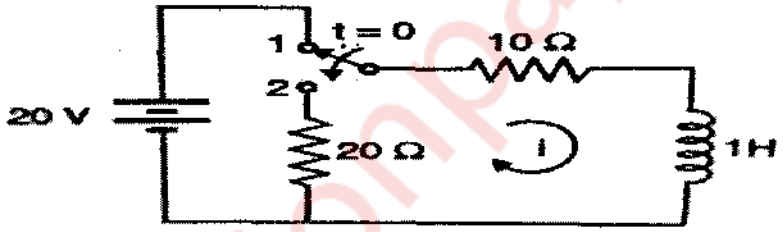


(b) Test whether the following polynomials are Hurwitz polynomials. (10)

(i) $P(s) = S^4+5S^3+5S^2+4S+10$

(ii) $P(s) = 2S^4+5S^3+6S^2+3S+1$

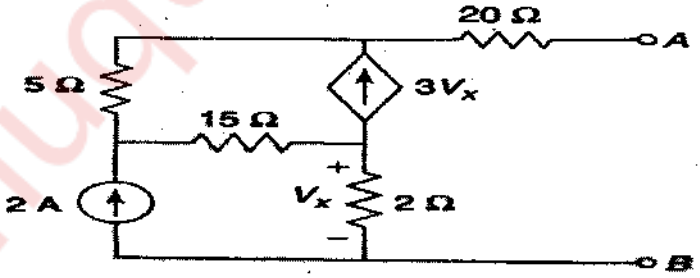
Q. 4) (a) In the circuit given, switch K is changed from position 1 to position 2 at time t=0. Find i , $\frac{di}{dt}$, $\frac{d^2i}{dt^2}$ at time $t=0^+$. (10)



(b) Determine the Foster forms of realization of the RC impedance function. (10)

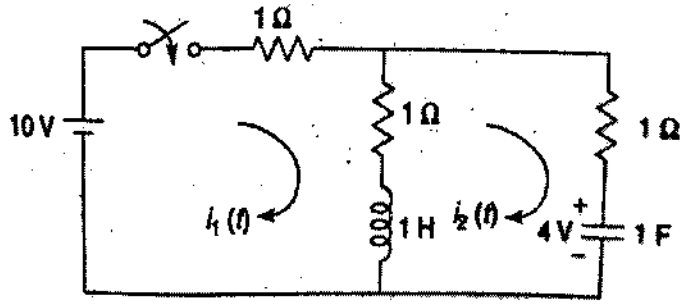
$$Z(s) = \frac{(s+1)(s+3)}{s(s+2)(s+4)}$$

Q.5) (a) Find Norton's equivalent of the following network. (10)

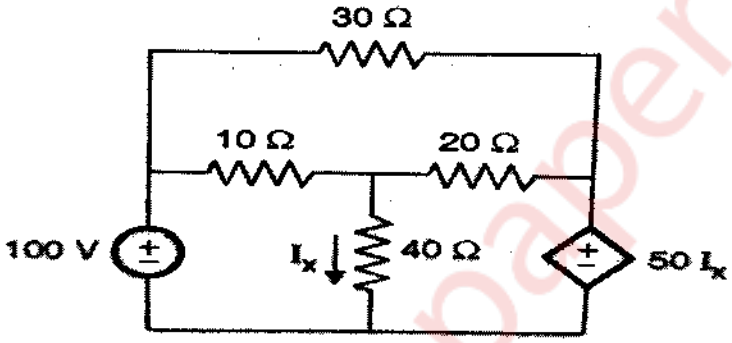


TURN OVER

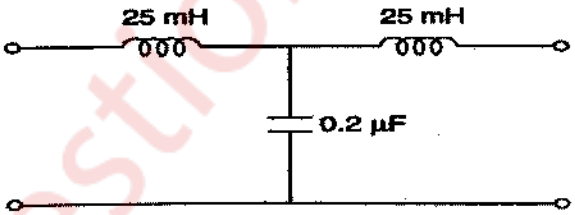
(b) Find the currents $i_1(t)$ and $i_2(t)$ when initial current through the inductor is zero and initial voltage on the capacitor is 4V. (10)



Q. 6) (a) Find current through 20Ω resistor using mesh analysis. (10)



(b) Find the nominal impedance, cut off frequency and pass band for the network. (6)



(c) Find poles and Zeros of the impedance of the following network and plot pole zero diagram. (4)