(3 Hours) [Total Marks: 80]

N.B: (1) Question No.**1** is **compulsory.**

(2)Attempt any **three** questions from **remaining** questions.

(3)Assume suitable **data** if **required.**

(4)**Attempt every question in a group and not randomly.**

1. (a) Check for Hurwitz polynomial (20)

$Q(S) = S^5 + S^3 + S^1$

$Q(S) = S^4 + 6S^3 + 8S^2 + 10$

(b) Obtain s-domain (Laplace Transform) equivalent circuit diagram of an inductor and capacitor with initial conditions.

(c) What are conditions for rational function F(S) with real coefficient to be p.r.f?

(d) Explain Y-parameter in terms of Z-parameter.

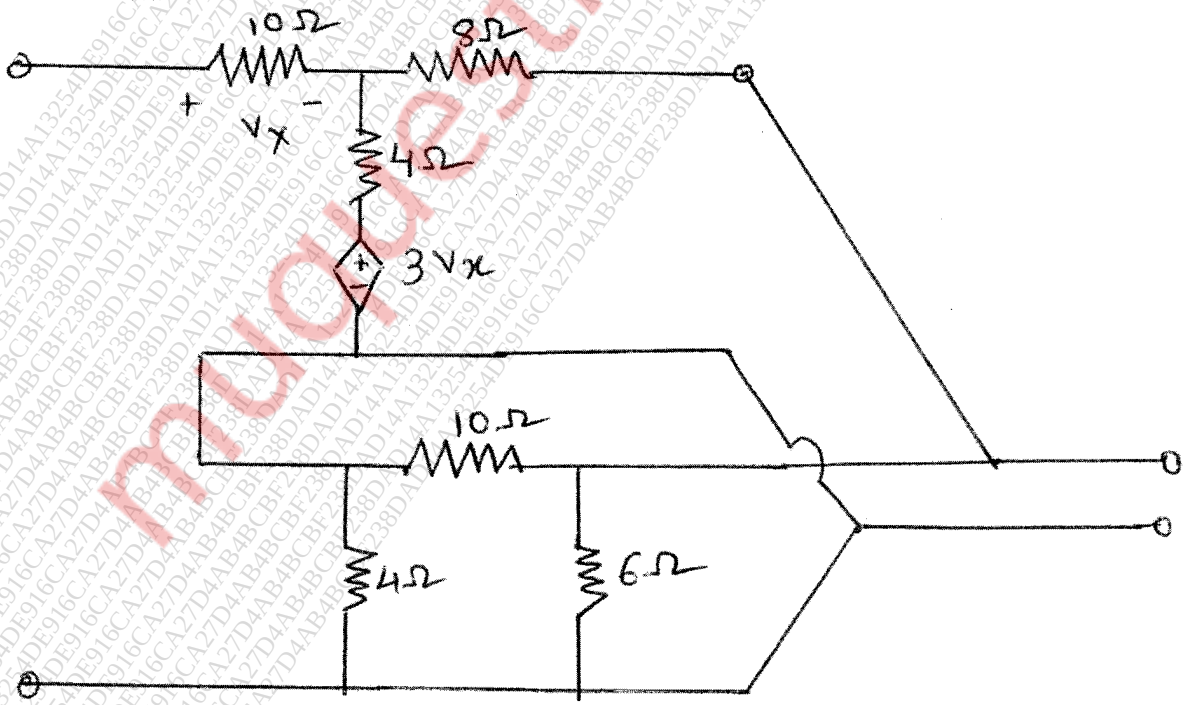
2. (a) Realise the following function in Foster-I and Foster-II forms. (20)

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

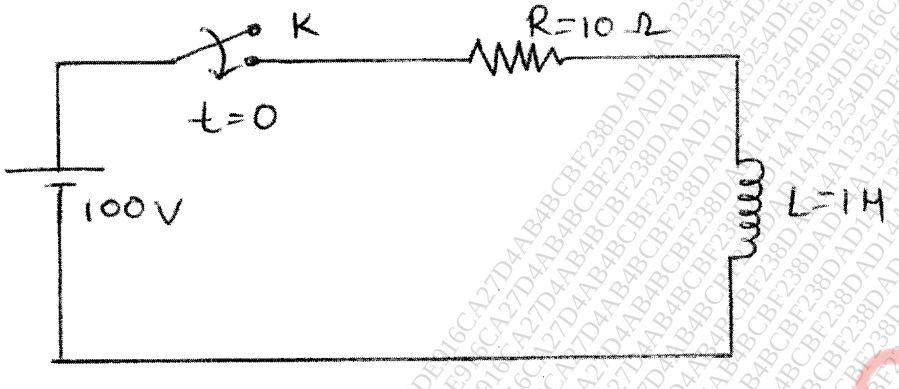
(b) Realise the following function in Cauer –I and Cauer-II forms.

$$Z(S) = \frac{(S+1)(S+3)}{S^2+2S}$$

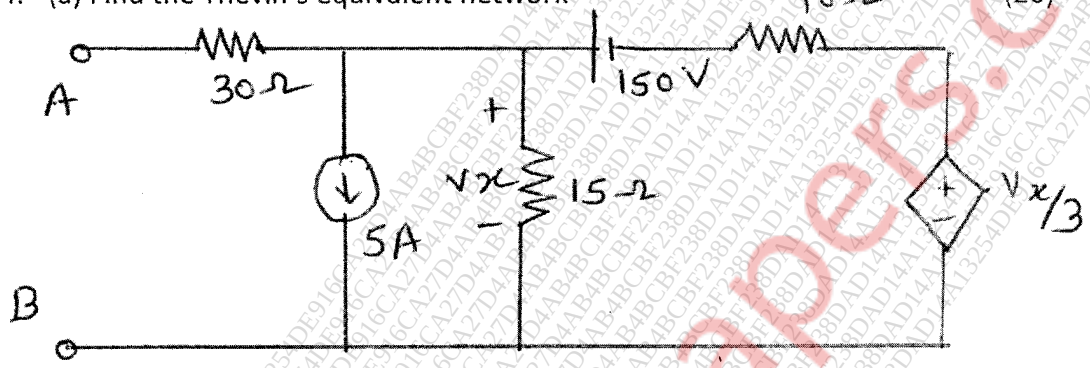
3. (a) Obtain hybrid parameter of the inter connected network. (20)



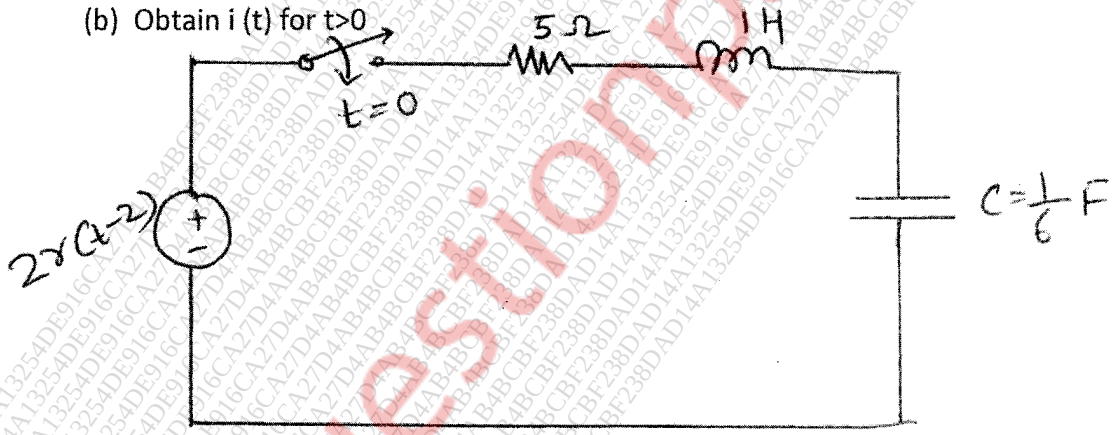
(b) The switch is closed at t=0, find values of I, $\frac{dI}{dt}$, $\frac{d^2I}{dt^2}$ at t=0+.Assume all initial current of inductor to be zero for circuit



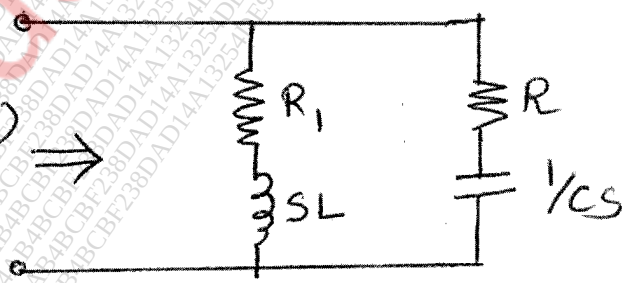
4. (a) Find the Thevin's equivalent network (20)



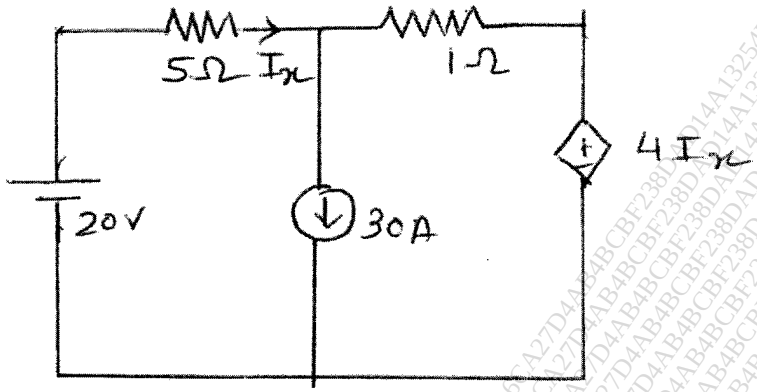
(b) Obtain i (t) for t>0



5. (a) The poles and zeros of the network shown below are as follows:
Poles at -1+j$\sqrt{5}$, -1-j$\sqrt{5}$, zeros at -1,-3 and the scale factor is K. If Z(0) = 1.Find the values of R,R_1,L and C.



(b) Find the current Ix using superposition theorem.



6. (a) Check whether the following functions are prf or not:- (20)

$$F(S) = \frac{2S^4 + 7S^3 + 11S^2 + 12S + 4}{S^4 + 5S^3 + 9S^2 + 11S + 6}$$

(b)Find Voltage across 5Ω resistor using mesh Analysis.