Circuit and Systems
Assignment No. 4

Que.1→ Write the necessary and sufficient conditions for any rational function to be positive real function.

Que.2→ Write the properties of LC, RC & RL network functions.

Que.3→ Check whether the given functions are positive real functions or not -

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

(ii) $F(s) = \dfrac{s^3+5s^2+9s+3}{s^3+4s^2+7s+9}$

(iii) $\dfrac{s^2+10s+4}{s+2}$

Que.4→ Synthesize the network function,

$$Z(s) = \dfrac{s(s^2+4)}{2(s^2+1)(s^2+9)}$$

as a Foster-I and Foster-II form.

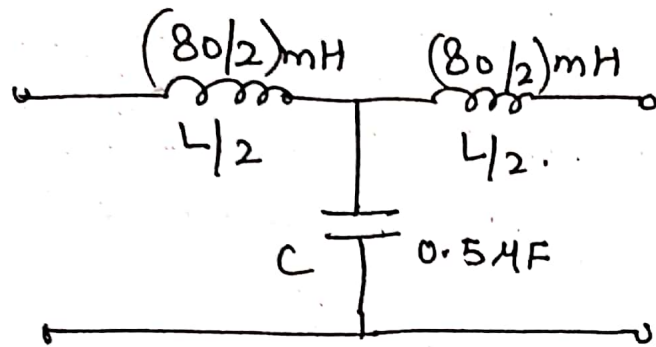**Que.5→** Synthesize the f⁶ $Z(s) = \dfrac{2s^5+12s^3+16s}{s^4+4s^2+3}$

as Cauer-I form.

Que.6→ Synthesize the f^h $Z(s) = \dfrac{(s^2+1)(s^2+3)}{s(s^2+2)}$ as
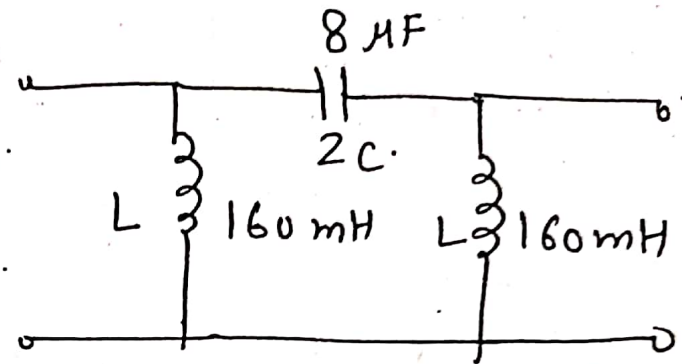
Cauer-II form

Que.7→ Define all parameters of a filter.

Que.8→ Derive all characteristics of Costant k
(a) low pass, (b) band pass filters.

Que-9→ Determine the nominal characteristic or design impedance and the cut-off frequency for the filters shown in fig below.

$(80/2)$ mH $\quad$ $(80/2)$ mH

$L/2$ $\qquad$ $L/2$.

$C \overline{} \, 0.5 \mu F$

(a) Low pass filter

8 μF

$2C$.

$L \gtrless 160$ mH $\qquad$ $L \gtrless 160$ mH

(b) High pass filter.

Que-10→ Design a constant-k band pass filter with cut-off frequencies of 2 kHz and 5 kHz and nominal characteristic impedance of $R_0 = 600 \, \Omega$.