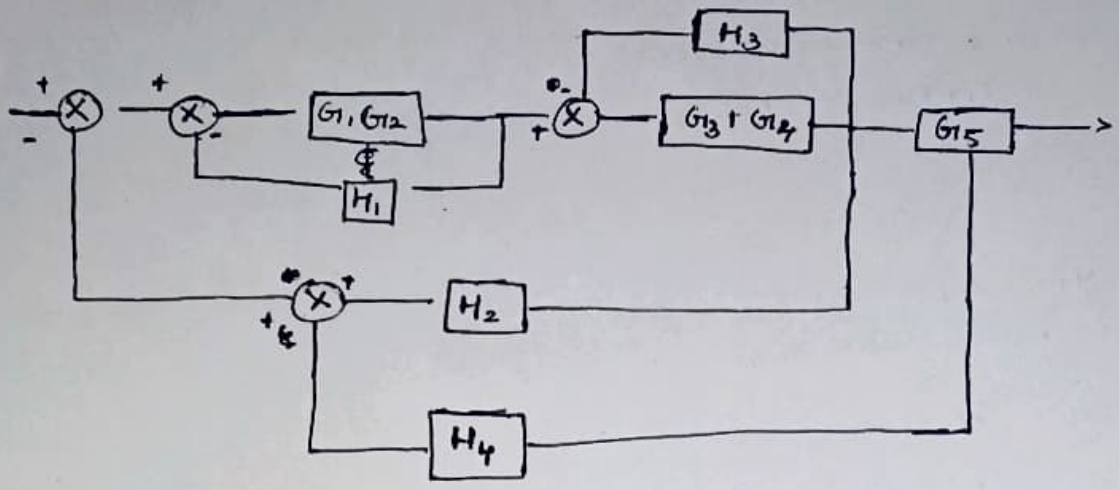
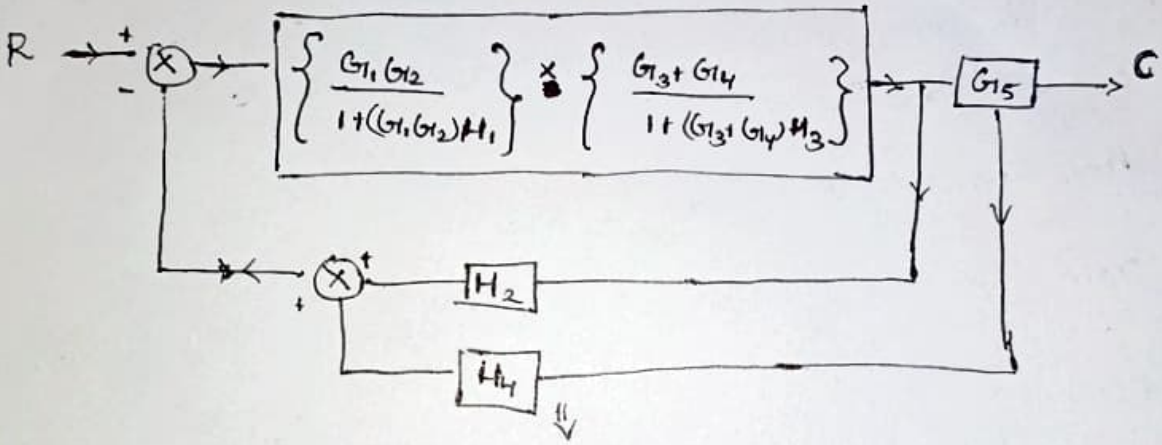
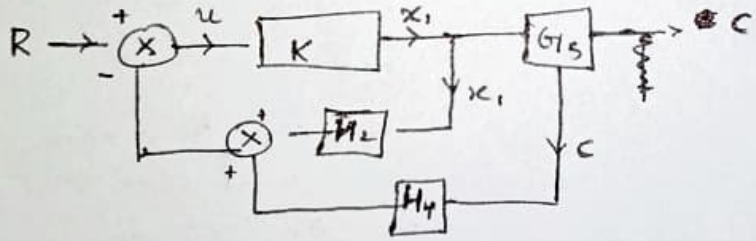
a)







$x_1 = Ku$

$u = R - (x_1H_2 + CH_4)$

$u = R - (KH_2u + CH_4)$

$u = \frac{R - CH_4}{1 + KH_2}$

$C = G_5x_1$

$C = G_5Ku$

$C(1+KH_2) = G_5K(R - CH_4)$

$C(1 + KH_2 + KH_4G_5) = RKG_5$

$C = R\left[\frac{KG_5}{1 + KH_2 + KH_4G_5}\right]$

TF

where

$K_a = \left\{\frac{G_1G_2}{1+(G_1G_2)H_a}\right\} \times \left\{\frac{G_3+G_4}{1+(G_3+G_4)H_3}\right\}$