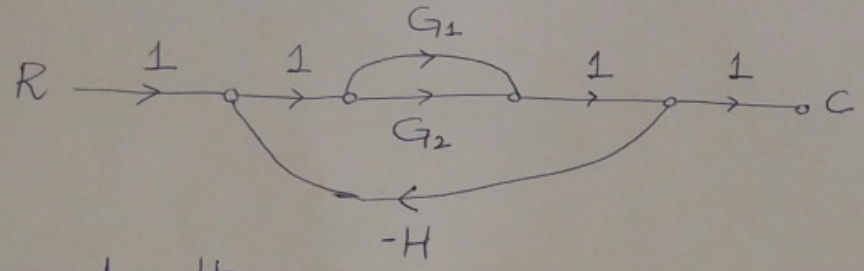
Find gain using Mason's gain formula.

Sol:-



a) Forward path gain :-

$P_1 = G_1$ and $P_2 = G_2$

b) Individual loops :-

$P_{11} = -G_1H$

$P_{12} = -G_2H$

c) Non-touching loops :-

None as both loops touch the forward paths respectively, so $\Delta_1 = 1$ and $\Delta_2 = 1$

Now, $T = \frac{1}{\Delta} \sum_K P_K \Delta_K$

Here, $T = \frac{1}{\Delta}(P_1\Delta_1 + P_2\Delta_2)$

$$T = \frac{G_1(1) + G_2(1)}{1-(-G_1H - G_2H)}$$

$$T = \frac{G_1(1) + G_2(1)}{1 + G_1H + G_2H}$$

or $$T = \frac{G_1 + G_2}{1 + G_1H + G_2H}$$

Above equation gives overall gain of the system