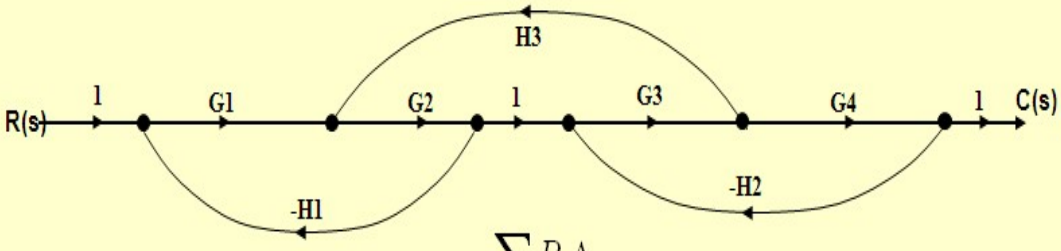
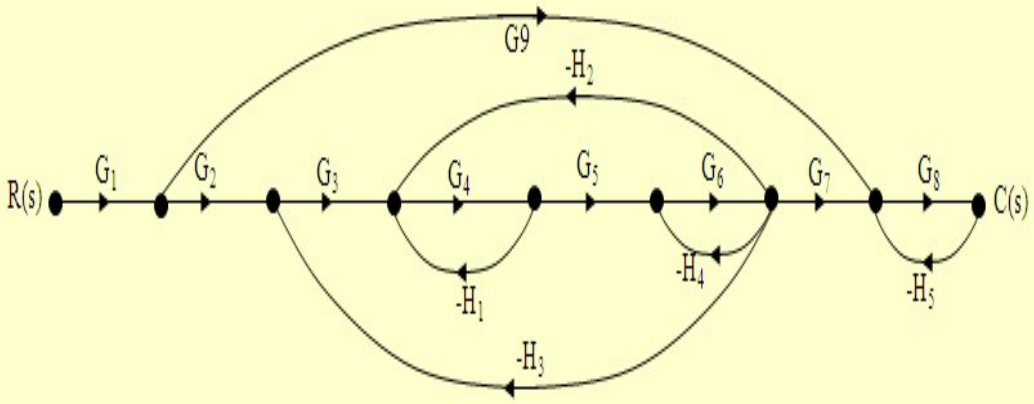
Example-1: Determine the transfer function C(s)/R(s).



$$T(s) = \frac{\sum P_k \Delta_k}{\Delta}$$

- $P_1 = G_1G_2G_3G_4 \qquad \Delta_1 = 1$ There is no P_2 or Δ_2 or more.
- $\sum L_1 = -G_1G_2H_1 + G_2G_3H_3 - G_3G_4H_2$
- $\sum L_2 = G_1G_2G_3G_4H_1H_2$
- $\Delta = 1 - \sum L_1 + \sum L_2 = 1 + G_1G_2H_1 - G_2G_3H_3 + G_3G_4H_2 + G_1G_2G_3G_4H_1H_2$
- $T(s) = \dfrac{\sum P_1\Delta_1}{\Delta} = \dfrac{G_1G_2G_3G_4}{1 + G_1G_2H_1 - G_2G_3H_3 + G_3G_4H_2 + G_1G_2G_3G_4H_1H_2}$

Example-2: Determine the transfer function C(s)/R(s).



$$M_1 = G_1G_2G_3G_4G_5G_6G_7G_8 \qquad \Delta_1 = 1$$

$$M_2 = G_1G_9G_8 \qquad \Delta_2 = 1-[-G_4H_1 - G_6H_4 - G_3G_4G_5G_6H_3 - G_4G_5G_6H_2] + G_4H_1G_6H_4$$

$$= 1 + G_4H_1 + G_6H_4 + G_3G_4G_5G_6H_3 + G_4G_5G_6H_2 + G_4H_1G_6H_4$$

$$\Delta = 1-[-G_4H_1 - G_6H_4 - G_3G_4G_5G_6H_3 - G_4G_5G_6H_2 - G_8H_5]$$

$$+[G_4H_1G_6H_4 + G_4H_1G_8H_5 + G_6H_4G_8H_5 + G_8H_5G_4G_5G_6H_2 + G_8H_5G_3G_4G_5G_6H_3]$$

$$+G_4H_1G_6H_4G_8H_5$$

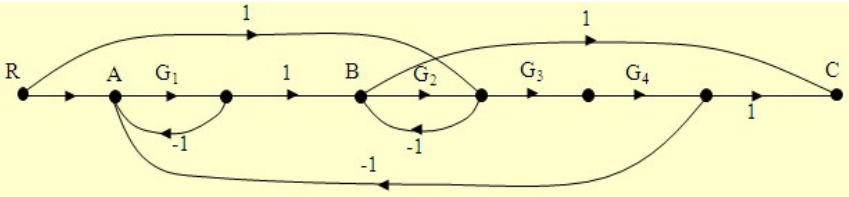
$$\Delta = 1 + G_4H_1 + G_6H_4 + G_3G_4G_5G_6H_3 + G_4G_5G_6H_2 + G_8H_5$$

$$+G_4H_1G_6H_4 + G_4H_1G_8H_5 + G_6H_4G_8H_5 + G_8H_5G_4G_5G_6H_2 + G_8H_5G_3G_4G_5G_6H_3$$

$$+G_4H_1G_6H_4G_8H_5$$

$$T(s) = \frac{C(s)}{R(s)} = \frac{M_1\Delta_1 + M_2\Delta_2}{\Delta} = \frac{G_1G_2G_3G_4G_5G_6G_7G_8 + G_1G_9G_8[1 + G_4H_1 + G_6H_4 + G_3G_4G_5G_6H_3 + G_4G_5G_6H_2 + G_4H_1G_6H_4]}{\Delta}$$

Example-3: Determine the transfer function C(s)/R(s).



$$M_1 = G_1G_2G_3G_4 \qquad \Delta_1 = 1$$
$$M_2 = G_1 \qquad \Delta_2 = 1$$
$$M_3 = G_3G_4 \qquad \Delta_3 = 1 + G_1$$
$$M_4 = -1 \qquad \Delta_4 = 1 + G_1$$
$$M_5 = -G_3G_4G_1 \qquad \Delta_5 = 1$$

$$\Delta = 1 - (-G_1 - G_2 - G_1G_2G_3G_4) + G_1G_2 = 1 + G_1 + G_2 + G_1G_2G_3G_4 + G_1G_2$$

a) $$\frac{C}{M} = \frac{G_1G_2G_3G_4 + G_1 + G_3G_4(1+G_1) - (1)(1+G_1) - G_1G_3G_4}{1 - (-G_1 - G_2 - G_1G_2G_3G_4) + G_1G_2}$$