INDIAN INSTITUTE OF SPACE SCIENCE AND TECHNOLOGY
THIRUVANANTHAPURAM 695 547

B.Tech (Avionics)-Tutorial-1, March 2024

AV224 – Control Systems

1. Find the transfer function , $G(s) = \frac{X(s)}{F(s)}$ for the mechanical system shown in Fig. 1:

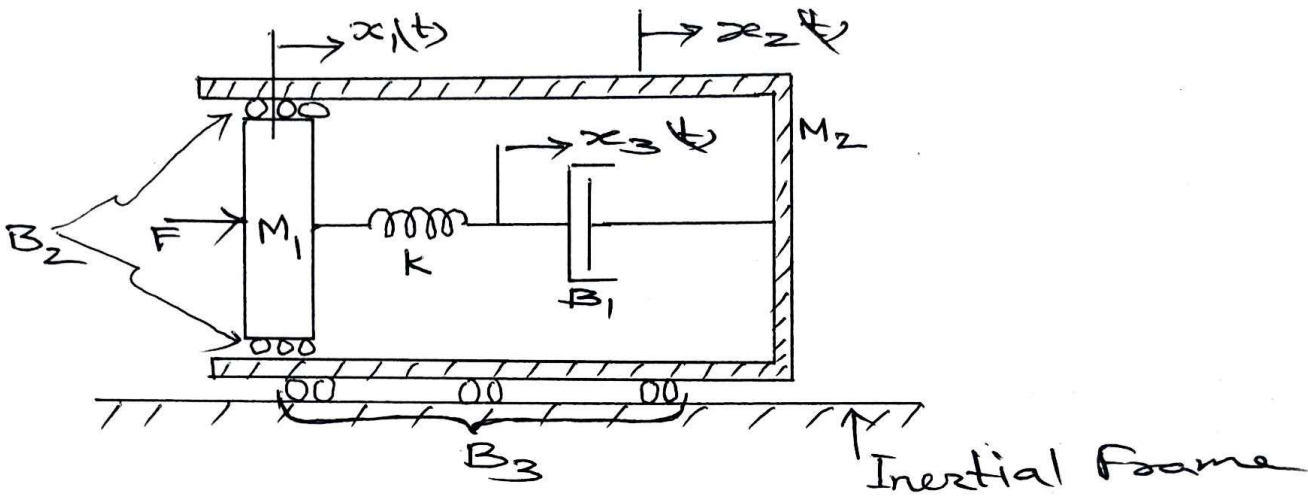

Figure 1: Signal Flow Graph

2. Find the transfer function, $G(s) = C(s)/R(s)$ in terms of the loop gains, L_i and forward path gains, P_k corresponding to the signal flow graphs shown in Fig. 2 and Fig. 3:

   (a) Figure 2:

   (b) Figure 3:

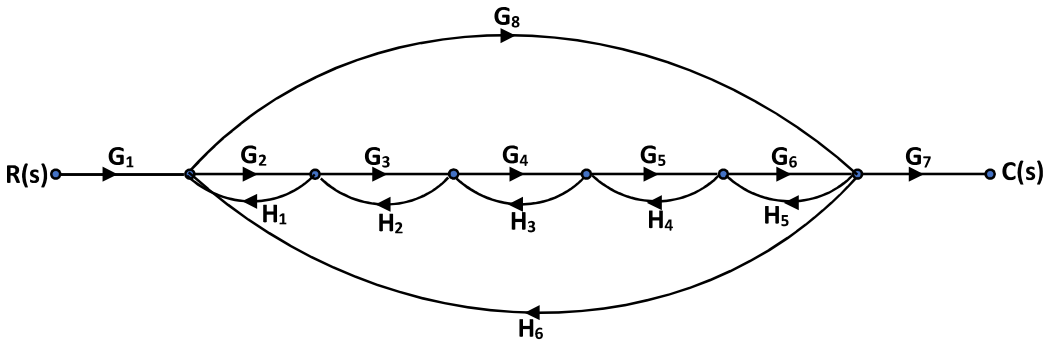

Figure 2: Signal Flow Graph

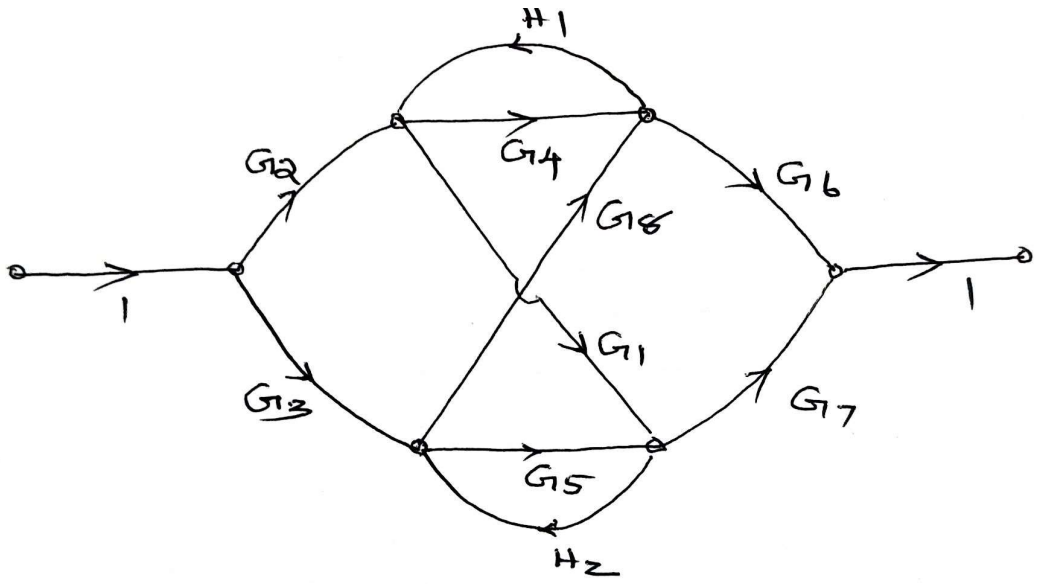

Figure 3: Signal Flow Graph

3. A pressure measurement system having the transfer function,

$$G(s) = \frac{c}{s^2 + a.s + b}\ V/Pa,\ c \neq b, \text{and } a, b, c > 0$$

is used for measuring the pressure inside a rocket fuel storage tank having a monotonic pressure decrease of $-1000\ Pa/s$. Find the steady state error in the measured pressure using the appropriate static error constant.