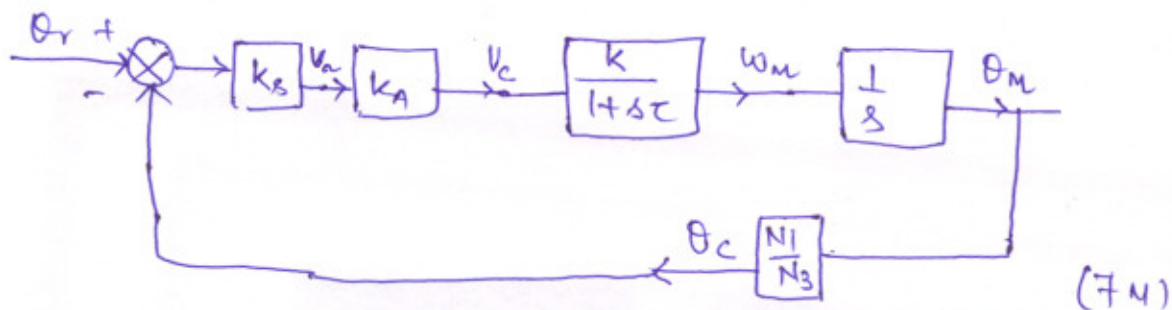


Solution of Quiz 2 held on 27/07/04

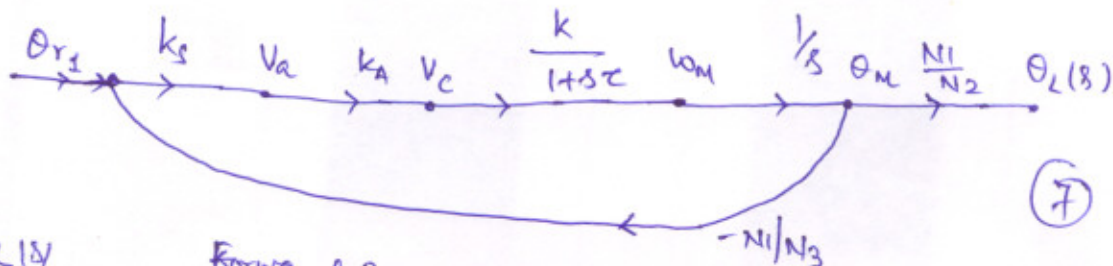
(A)



$$\frac{\theta_m(s)}{\theta_r(s)} = \frac{k_s k_A k}{s(1+s\tau) + k_s k_A k \cdot N_1/N_3}$$

Putting the values: $\frac{\theta_m(s)}{\theta_r(s)} = \frac{12000}{3s^2 + 1000s + 1200}$ (3M)

(B)



here $\frac{\theta_L(s)}{\theta_r(s)} = \frac{\text{Forward Path Gain}(R) \times D_1}{1 - \text{loop gain}(L)}$

$$P_1 = k_s \cdot k_A \cdot k \cdot \frac{1}{1+s\tau} \cdot \frac{1}{s} \cdot \frac{N_1}{N_2}$$

$$D_1 = 1$$

$$L = -k_s k_A k \cdot \frac{1}{1+s\tau} \cdot \frac{1}{s} \cdot \frac{N_1}{N_3}$$

$$\frac{\theta_L(s)}{\theta_r(s)} = \frac{225 \times 10^3}{s^2 + 250s + 225 \times 10^3}$$

(3)