Problem Set #6

October 30, 2016

1) For the block diagrams given below find the required transfer functions.

i) \[ \frac{y}{\text{ysp}} = ? \] (Note: this is a block diagram of cascade control)

ii) \[ \frac{y}{\text{ysp}}, \frac{y}{u_1}, \frac{y}{u_2}, \frac{e}{\text{ysp}}, \frac{e}{u_1}, \frac{e}{u_2} = ? \]

iii) \[ \frac{y}{\text{ysp}}, \frac{y}{d} = ? \]
iv) B = G(1 - e^{-Ds})

\[ \frac{y}{r} = ? \]

2) Consider the following block diagram.

If \[ G_1 = 5, G_2 = \frac{1}{2s+1}, G_3 = \frac{2}{(s+1)(3s+1)}, G_4 = \frac{1}{s+1}, G_5 = \frac{1}{(s+1)(3s+1)} \]

find the following closed loop transfer function

i) \[ \frac{y}{y_{sp}} \]

ii) \[ \frac{y}{d} \]

iii) Are these closed loop transfer functions stable?