Assignment 6

Problem 1

Given the following plant:

$$G(s) = \frac{(4s+1)(s-2)}{(5s+1)(2s-1)} \tag{1}$$

1. Design an H_∞ loop-shaping controller (one or two degrees of freedom as suitable) to ensure 0 steady-state errors for ramp following.
2. Explain how your design needs to be modified to accommodate a time delay of e^{-2s} at the G(s) plant input.

Problem 2

Design, implement and show the performance through analysis and simulation of a controller for the following $2X2$ plant:

- g11 (from u_1 to y_1) has a gain of 2.2, a time constant of 50[s] and exhibits dead time of 150[s].
- g12 (from u_2 to y_1) has a gain of 0.6, a time constant of 50[s] and exhibits dead time of 120[s].
- g21 (from u_1 to y_2) has a gain of -2, a time constant of 60[s] and exhibits dead time of 120[s].
- g22 (from u_1 to y_2) has a gain of -1.2, a time constant of 120[s] and exhibits dead time of 60[s].

that satisfies the following objectives:

1. Steady state error 0 for step references, input and output disturbances in all channels.
2. Fast tracking of a reference (with a rising time increased up to 25% and a maximum 10% overshoot).