Lab 2: Report Marking Criteria

You may work in a group of up to three members. All group members must attend the same lab session. Submit the report on Canvas.

The report for Lab 2 has a total of **(50 marks)** worth **5%** of your total grade for Advanced Control Systems.

For the entire report:

- Present results and diagrams clearly with explanations. Plots require a legend, title, x-axis and y-axis labels.
- Have you adjusted all of your simulation parameters to the values as instructed?
- Presentation quality of the report **(5 marks)**

0.1

- Present your results, Simulink diagrams, and MATLAB scripts **(8 marks)**
- Compare the calculated sum of squared error for Cases A – C. Which is best? Why? Explain how this calculation was performed. **(3 marks)**

Case A:

For the MATLAB PID Controller Block, show that:

$$P = K_c$$
$$I = \frac{K_c}{\tau_I}$$
$$D = K_c \tau_D$$
$$N = \frac{1}{0.1\tau_D}$$

(2 marks)

Case B:

Discuss the effects of putting the Derivative on the output and show evidence. **(2 marks)**

Case C:

Discuss the effects of putting Proportional gain on the output and show evidence. **(2 marks)**

0.2

1. Explain the derivation of the formulae for $K_c, \tau_I, \tau_D, \tau_f$ as a function of: c_2, c_1, c_0 l_0, etc. as explained in the lecture slides. How is this related to the tuning parameter ω_n? **(5 marks)**
2. Present your results, Simulink diagrams, and MATLAB scripts **(14 marks)**

Case C:

1. What are the effects of increasing ω_n ? Show evidence. **(3 marks)**
2. For what value of ω_n are there sustained oscillations? **(1 mark)**
3. What happens if ω_n is increased beyond the point of sustained oscillation? Why? Show evidence. Is this related to the modelling of the time delay? **(5 marks)**