**ECE 311 - Lab 2**

*Name Surname*

DD/MM/YYYY

**1 - INTRODUCTION**

In this section, you will summarize the main purpose of this lab and briefly describe the experiments you performed.

**2 - EXPERIMENTS**

In this section you will report all your experimental simulation: discuss your hypothesis and results.

**2.1 OPEN LOOP RESPONSE**

Include here the open loop response (position and velocity) of your cart to periodic square wave input.

**2.2 IDENTIFICATION OF MODEL**

In this section you will discuss about your estimation of the parameters *a* and *b.*

Be sure to include the following material and discussions:

1. The plot showing the response for your initial guess for the parameters *a* and *b*
2. The derivation of the expression *a=f(b)* (check the lab instructions), including the plots where you measure the output variation 𝚫*v*
3. The final choices for *a* and *b* and the corresponding plot response

**2.3 PROPORTIONAL CONTROL**

In this section you will discuss about your findings regarding the proportional controller.

Be sure to include the following material and discussions:

1. Your hypothesis about the asymptotic tracking performances with a P controller
2. The first closed loop response for your closed loop system with *K=5*
3. Your comments about the matching of the experimental data and initial theoretical hypothesis
4. Your hypothesis about the effect of an increasing controller gain *K*
5. Two more plots for inccreasing values of *K*
6. Your final considerations about the effect of an increasing *K*

**2.4 PROPORTIONAL-INTEGRAL CONTROL**

In this section you will include the following material and discussions:

1. Your first simulation plots with the proposed values of *K* and *T\_i*
2. Two more plots for inccreasing values of *K*
3. Discuss about the effect of an increasing *K*

**3 - CONCLUSIONS**

In this section you need to answer the following questions:

1. How does changing the control parameters affects the closed loop performance?
2. How does the performance of the P and PI controllers compare?
3. Which controller is best suited for our objective, i.e. tracking a square wave signal?