Control System Laboratory Report

Name and ID no. of the Student:

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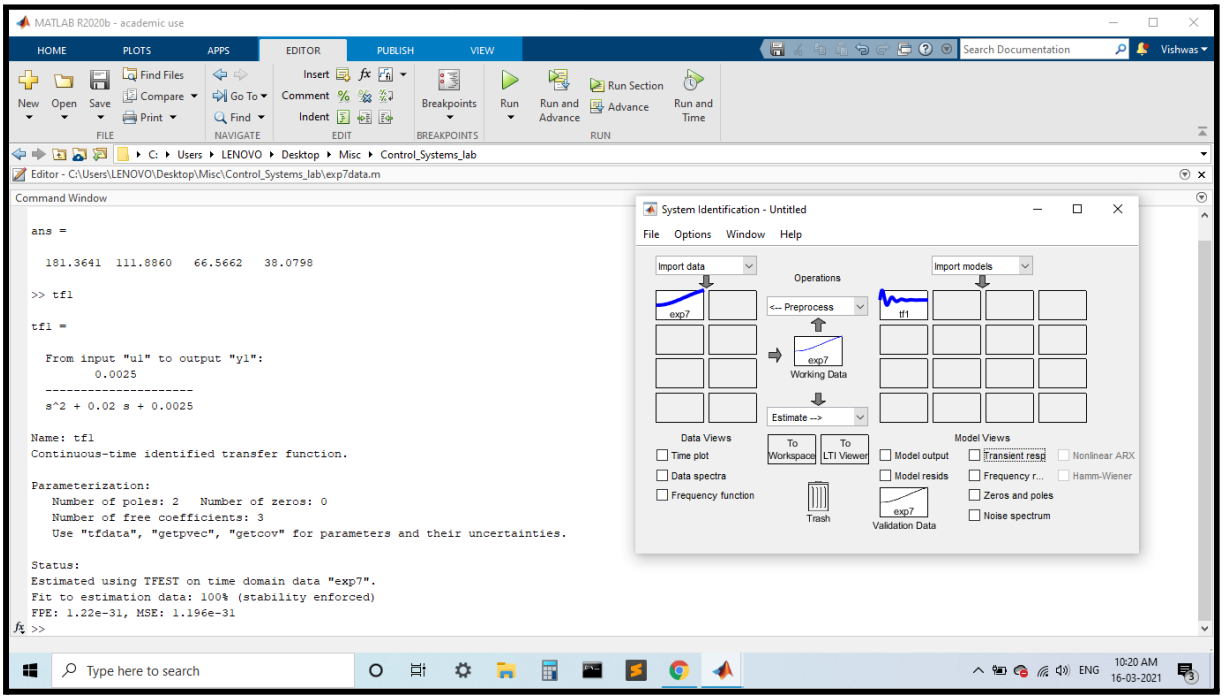
Title of the Experiment:

Measurement of Servo Speed and Moment of Inertia.

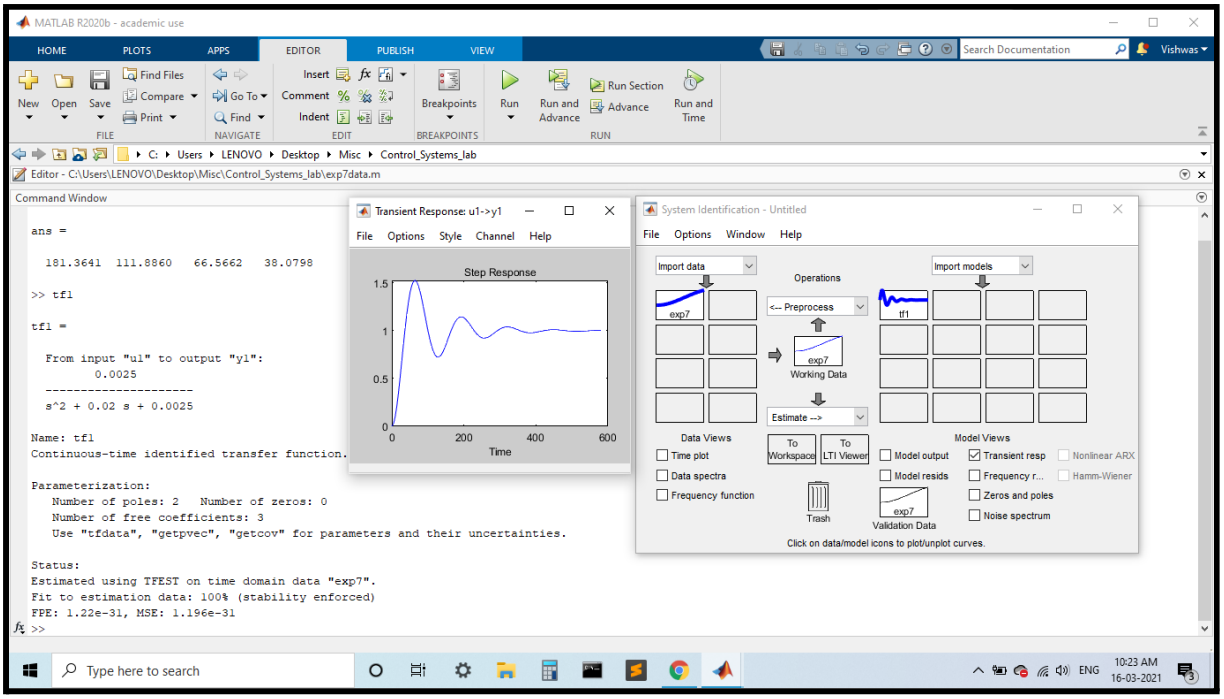
Model/Simulation:

The image for the simulation using the systemIdentification toolbox is given below:



Results:

The image below shows the transfer function along with the step response of the transfer function



Conclusive Remarks:

Using the system identification toolbox and the results that we obtained above we can calculate the moment of inertia off the servo. The transfer function as seen in the result image is given by $0.0025/(s^2 + 0.02s + 0.0025)$ this can be compared to the standard second order equation given by $\omega_n^2/(s^2 + 2\xi\omega_n s + \omega_n^2)$ where ξ is the damping ratio and the ω_n is the natural frequency and comparing it with the servo equation given by $H(s) = (K/J)/(s^2 + (B/J)s + K/J)$ we get $B/J = 0.02$, and we know that $B = 1.2$ N-m-s/rad. We get, $J = 60$ kg m^2. (We don't consider the spring constant to calculate the moment of inertia because the friction coefficient affects the moment of inertia more than the spring constant)

To conclude, we used the system identification toolbox to generate our transfer function with the help of the given inputs and outputs of the system (assuming second order system) which we then manipulated to calculate the moment of inertia.