EE6221 – Assignment for Robot Control
(not for submission)

1. Design the α, β partitioned controllers (or computed torque controllers) for the following nonlinear systems:

a) $3\theta\ddot{\theta} + 5\dot{\theta}^2 - 2cos(\theta) = \tau$

b) $\ddot{\theta} + 2cos(\theta) + \sqrt{3}\theta\ddot{\theta} + \dot{\theta} + \sqrt{2\theta} = \tau$

2. The dynamic equations of a three-link robot is given as:

$$m_2 r^2 \ddot{\theta} + 2m_2 r \dot{r}\dot{\theta} = \tau_1$$

$$(m_1 + m_2)\ddot{h} + (m_1 + m_2)gh = \tau_2$$

$$m_2\ddot{r} - m_2 r \dot{\theta}^2 = \tau_3$$

Design a PD computed torque control law in joint space for the robot. Choose gains so that this system is critically damped. Note that the lowest structural resonance equals 14.5 Hz.   (Ans: $k_v = 90$, $k_p = 2025$)