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| King Saud University  Computer Engineering Department  College of Computer and Information Sciences | 1st semester 1436/1437 H  CEN455: Introduction Digital Control |

**HW # 1**

Name: ID#

**Question 1 (design via pole placement)**

Use a PD controller to control the system to meet the specifications

**Question 2(design via rootlocus)**

A unity feedback system with the forward transfer function is operating with a closed-loop step response that has 30% overshoot. Do the following:

1. Evaluate the steady-state error for a unit ramp input (use Matlab).
2. Design a lag compensator to improve the steady-state error by a factor of 10.
3. Evaluate the steady-state error for a unit ramp input to your compensated system.
4. Evaluate how much improvement in steady-state error was realized.

**Question3(digital controller)**

Given the system of Figure, a lead compensator yields a 20% overshoot (= 0.456) and *Kv* = 40, with a peak time of 0.1 second. In order to meet the requirements, the design yielded *K =* 1440 and a lead compensator,



If the system is to be computer controlled, find the digital controller,

