CE203/SC301 Tutorial 10: Sampled Control System

1. The transfer function of a plant is given as:

$$G_p(s) = 1/\{ s\{1 + 0.2s) \}$$

It is to be controlled by a digital unity feedback gain system using a sampling frequency of 10Hz. The output of the digital controller (gain = K) is passed through a sample and hold circuit before feeding directly to the plant.

(a) Draw the block diagram of the system.
(b) Find the characteristic equation of the system.
(c) Find the maximum allowable gain of the controller, K, for the system to be stable.

2. A unity feedback gain system employing digital control with a sampling rate of 0.8s is used to control a plant. The transfer function of the controller, actuator and the plant is:

$$K/\{ s(1 + 0.5s) \}$$

Find the range of K for stability.