Assignment for Chapter 7: System Compensation

1. Given the open-loop transfer function of a unity-feedback system by

$$G(s) = \frac{40}{s(s+4)},$$

determine what kind of cascade compensator should be applied such that the gain crossover frequency the compensated system is ω_c=10rad/s and ω_c=4 rad/s respectively. Moreover, the system needs to satisfy the following requirements:

(a) The steady-state error with respect to the ramp input $u(t) = At$ is less than $0.1A$;

(b) Phase margin is not less than 45°.

2. Design the compensator for the system in Question 1 by using the Bode diagram method.