Name: _____
Matriculation Number: _____

Consider a feedback control system for which plant transfer function and feedback path transfer function are

$$G_p(s) = \frac{10}{s(0.1s+1)}, \quad H(s) = 1$$

We wish to design a controller to meet the following specifications:

i. zero steady-state error for step input
ii. Steady-state error less than or equal to 1% for ramp input
iii. Less than or equal to 2% error for sinusoidal inputs of frequency up to 1 rad/sec.
iv. Phase margin greater than or equal to 45°

Suggest modification of the loop transfer function so that the first three of the four specifications are met.
Calculate the phase margin at this stage.
Verify, by finding the damping factor of the dominant 2nd order pole, that $\zeta \cong$ PM/100.

Note: we shall take this example to illustrate the steps for designing compensator that can improve PM without affecting system type and error constants.