AE 457/641 Navigation and Guidance

Insemester Test: 11:35am – 12:35pm, 24/10/07

Total Marks – 10

An A4-size sheet written on both sides in one's own handwriting allowed. Notes, photocopies, printed matter are not allowed. This question paper is printed on BOTH sides.

1. A missile follows an ideal pursuit trajectory to intercept a target moving uniformly along a straight line. The missile moves one and a half times faster than the target. If the closing velocity equals the missile velocity when the range is R_1, find the range when the closing velocity is half the missile velocity. (3)

2. A ground-to-air missile is to be launched to intercept an airborne target that is receding from the launch site along a straight line at an altitude of 1 km with a constant speed of 270 m/s. If the missile speed is 500m/s, and the target is 1 km away from the launch site (in terms of distance measured along the ground) at the time of launch, find the launch angle required to place the missile on a collision course with the target. Find the closing velocity and the time to intercept for the launch angle that you calculate. (4)

AE 457/641 Navigation and Guidance

Insemester Test: 11:35am – 12:35pm, 24/10/07

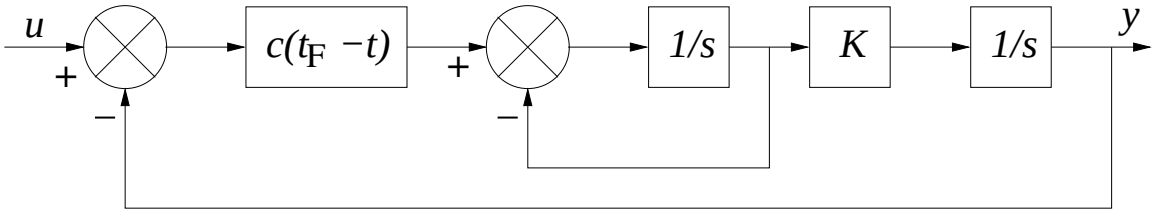
Total Marks – 10

An A4-size sheet written on both sides in one's own handwriting allowed. Notes, photocopies, printed matter are not allowed. This question paper is printed on BOTH sides.

1. A missile follows an ideal pursuit trajectory to intercept a target moving uniformly along a straight line. The missile moves one and a half times faster than the target. If the closing velocity equals the missile velocity when the range is R_1, find the range when the closing velocity is half the missile velocity. (3)

2. A ground-to-air missile is to be launched to intercept an airborne target that is receding from the launch site along a straight line at an altitude of 1 km with a constant speed of 270 m/s. If the missile speed is 500m/s, and the target is 1 km away from the launch site (in terms of distance measured along the ground) at the time of launch, find the launch angle required to place the missile on a collision course with the target. Find the closing velocity and the time to intercept for the launch angle that you calculate. (4)

3. In the block diagram below, $u(t) = t$ and K is a constant, while $y(0) = 0 = \dot{y}(0)$. Draw the adjoint that can be simulated to find $y(t_{\mathrm{F}})$ as a function of t_{F}. (3)



3. In the block diagram below, $u(t) = t$ and K is a constant, while $y(0) = 0 = \dot{y}(0)$. Draw the adjoint that can be simulated to find $y(t_{\mathrm{F}})$ as a function of t_{F}. (3)