Quiz 02

Course: Embedded control system
Professor: H. Belkebir
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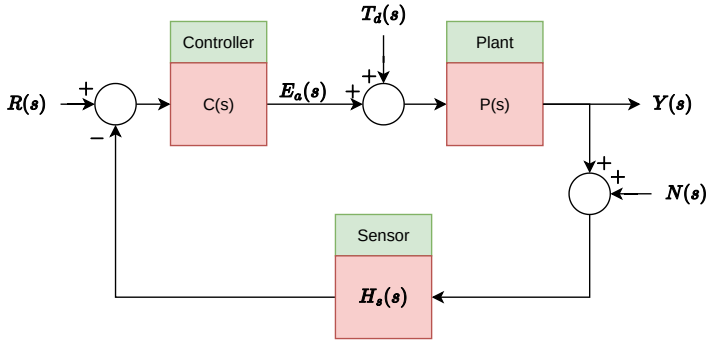
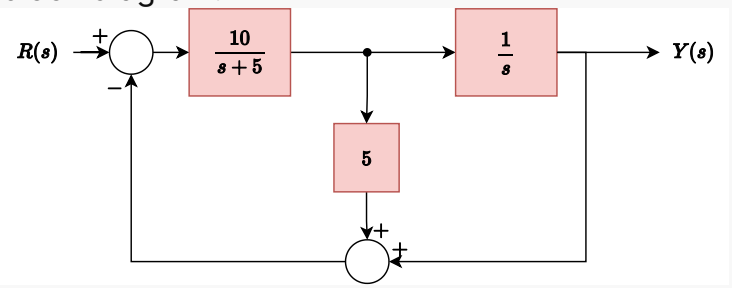
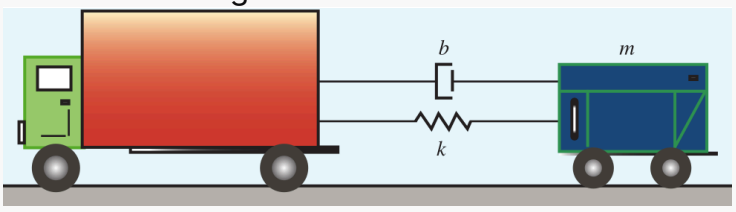
Duration: 20 min

First Name		Last name

In the following True or False and Multiple Choice problems, circle the correct answer.

N°	Questions	Answers	
1	Very few physical systems are linear within some range of the variables.	True	False
2	The s-plane plot of the poles and zeros graphically portrays the character of the natural response of a system.	True	False
3	A necessary condition for a system to be linear is homogeneity	True	False
4	The transfer function is the ratio of the Laplace transform of the output variable to the Laplace transform of the input variable, with all initial conditions equal to zero.	True	False
5	Consider the following system:  *diag74.svg* where: $C(s) = 10$, $H_s(s) = 1$ and $P(s) = \frac{s+50}{s^2+60s+500}$. If the input $R(s)$ is a unit step, $T_d(s) = N(s) = 0$, What is the final value $y_{ss}(\infty)$?	100 1 50 None of the above	
6	Consider the system illustrated by *diag74.svg* with:		

N°	Questions	Answers
	$C(s) = 20,\ H_s(s) = 1$ and $P(s) = \dfrac{s+4}{s^2 - 12s - 65}$ When all initial condition are zero, the input $R(s)$ is an impulse, $T_d(s) = N(s) = 0$, the output $y(t)$ is	$10e^{-5t} + 10e^{-3t}$ $e^{-8t} + 10e^{-t}$ $10e^{-3t} - 10e^{-5t}$ $20e^{-8t} + 5e^{-15t}$
7	Consider a system represented by the following block diagram:  diag75.svg The closed-loop transfer function is:	$H_{cl}(s) = \frac{50}{s^2+55s+50}$ $H_{cl}(s) = \frac{10}{s^2+55s+50}$ $H_{cl}(s) = \frac{10}{s^2+50s+55}$ None of the above.
8	Consider the differential equation: $\ddot{y}(t) + 2\dot{y}(t) + y(t) = u(t)$ where $y(0) = \dot{y}(0) = 0$. The poles of this system are:	$p_1 = -1, p_2 = -1$ $p_1 = 1\jmath, p_2 = -1\jmath$ $p_1 = -1, p_2 = -2$ None of the above
9	A cart of mass $m = 1000\,kg$ is attached to a truck using a spring of stiffness $k = 20000\,N/m$ and a damper of constant $b = 200\,Ns/m$, as shown in this figure:  diag76.svg The truck moves at a constant acceleration of $a = 0.7\,m/s^2$. The transfer function between the speed of the truck and the speed of the cart is:	$H_{cl}(s) = \frac{50}{5s^2+s+100}$ $H_{cl}(s) = \frac{s+20}{s^2+10s+25}$ $H_{cl}(s) = \frac{s+100}{5s^2+s+100}$ None of the above