AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
COMPUTER ENGINEERING AND SOFTWARE DEPARTMENT
CREDIT HOURS PROGRAM

Spring 2024 *10 Marks*

CSE371: Control Engineering

Assignment (1)

1) Find F(s) for the below f(t):

f(t) = $\frac{\sin(5t) - t\cos(3t)}{t}$ (2.5 marks)

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2) Find f(t) for the below F(s):

1) F(s) = $\frac{S-1}{(S^2+2S+2)(S+3)}$ (2.5 marks)

2) F(s) = $\frac{2S+5}{S^2+2S+5}$ (2.5 marks)

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3) Find x(t):

$2\ddot{x} + 3\dot{x} + 2x = sin(4t)$, x(0) = 0 & $\dot{x}(0) = 0$ (2.5 marks)

- **Delivery deadline is, next week**
- **The solution must be handwritten (*Only A4 Papers are accepted*).**
- **Please, make a cover for the Assignment and write on it in a clear fashion the course's name "CSE371: Control Engineering" + (yourName, ID, Program,Assignment #) + delivery date**

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Assignment (2)

1- Consider the following second-order system:

$$\frac{d}{dt}\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} -0.1 & 0.1 \\ 0 & -0.2 \end{bmatrix}\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 0.1 \end{bmatrix} u,\ y = x_1$$

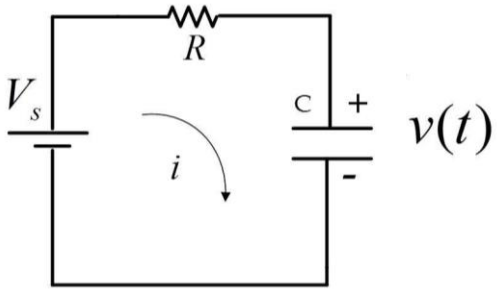
- Answer the following questions:

A- Assume that **the system's initial conditions are all zeros and u(t) is a unit step input.** Using Laplace transform technique solve the above first order differential equation and get the solution $x_1(t)$, & $x_2(t)$ for how they change over the time where $t \geq 0$. **(2 Marks)**

B- Calculate the steady-state value y_{ss} **(1 Mark)**

2- Find the value of K using Routh that makes the system stable.
a- $S^4+KS^3+S^2+S+1=0$ (1.5 mark)
b- $S^3+20S^2+5S+10K=0$ (1.5 mark)

3- Consider the system shown below, where R=1 KOhm, and C=10 uF.



If the system is subjected to a unit-step input **V_s(s)=1/s, and V(s) is the output Obtain:**

a) The system time constant (T). **(2 Marks)**
b) Draw the unit step response. **(1 Mark)**
c) *Find the impulse response.* **(1 Mark)**