**EE-792** **Quiz-3** **Summer-19**

**Last Name:** Q 266 T342 **First Name**_____

1. In controllable canonical form which of the following statement is **TRUE**

   a. All state variables depends upon the input
   b. All state variables depends upon the output
   c. Only one state variable depends upon the input
   d. Only one state variable depends upon the output

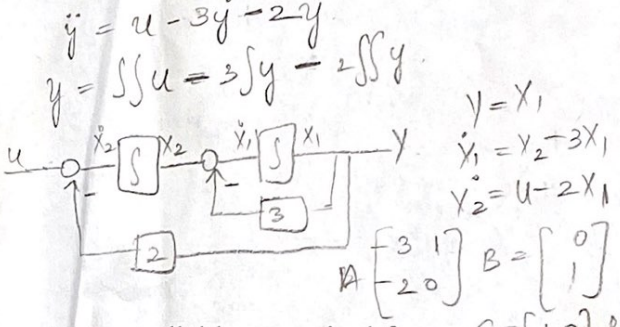
2. $\ddot{y} + 3\dot{y} + 2y = u$; write the state equation by using observable canonical form

   a. $\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix} = \begin{bmatrix}0 & 1\\ -2 & -3\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix} + \begin{bmatrix}0\\ 1\end{bmatrix}u$

   b. $\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix} = \begin{bmatrix}-3 & -2\\ 1 & 0\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix} + \begin{bmatrix}0\\ 1\end{bmatrix}u$

   c. $\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix} = \begin{bmatrix}-3 & 1\\ -2 & 0\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix} + \begin{bmatrix}1\\ 0\end{bmatrix}u$

   d. $\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix} = \begin{bmatrix}-3 & 1\\ -2 & 0\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix} + \begin{bmatrix}0\\ 1\end{bmatrix}u$



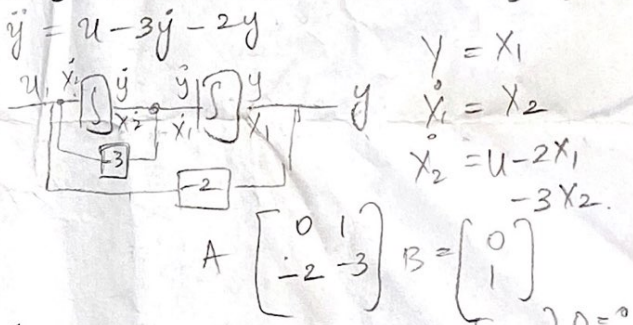

3. $\ddot{y} + 3\dot{y} + 2y = u$; write the state equation by using controllable canonical form

   a. $\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix} = \begin{bmatrix}0 & 1\\ -2 & -3\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix} + \begin{bmatrix}0\\ 1\end{bmatrix}u$

   b. $\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix} = \begin{bmatrix}-3 & -2\\ 1 & 0\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix} + \begin{bmatrix}0\\ 1\end{bmatrix}u$

   c. $\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix} = \begin{bmatrix}-3 & 1\\ -2 & 0\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix} + \begin{bmatrix}1\\ 0\end{bmatrix}u$

   d. $\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix} = \begin{bmatrix}-3 & 1\\ -2 & 0\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix} + \begin{bmatrix}0\\ 1\end{bmatrix}u$




4. Find 'C' in the following function $F_{(s)} = \frac{1}{(s+2)(s+1)^2} = \frac{A}{S+2} + \frac{B}{S+1} + \frac{C}{(s+1)^2}$

   a. 1
   b. -1
   c. -2
   d. 2

$1 = A(S+1)^2 + B(S+2)(S+1) + C$
$1 = AS^2 + A + 2SA + B3S + B2 + 3SB + 2B + C$
$1 = AS^2 + BS^2 + 2SA + 3SB + A + 2B + C$ (Trial Error)
$C = 1\ A = 0\ B = 0$

5. The denominator of the transfer function is called

   a. Characteristic equation
   b. Characteristic polynomial
   c. Eigenvalues of the vectors
   d. Poles of the given system

$(S+2)(S+1)$
$S^2 + 2S + S + 2$
$S^2 + 3S + 2$

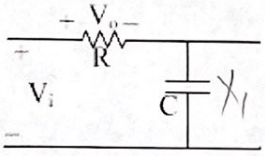
Please show your work for partial credit.
Each question worth 2 points; this quiz worth 2 % of your final grade.

**EE-792** **Quiz-2** **FALL-19**

WSU ID 02667342

10/10

1. Write the state equation for the given circuit




2/2

a. $\dot{X} = \frac{1}{RC}V_i - \frac{1}{RC}X$

b. $\dot{X} = \frac{1}{R}V_i - \frac{1}{R}X$

c. $V_0 = V_i - X_1$

d. $\dot{X} = V_i - X$

2. Which of the following statement is **FALSE**

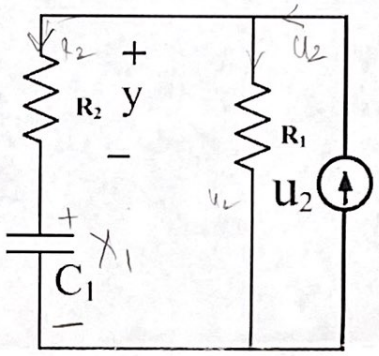
2/2

a. Number of state variables depends upon the number of energy storage elements

b. Single input and single output system will have only one state variable

c. State variable is nothing but current and voltage across any element

d. Input of the circuit can be either voltage or current




3. Write the output equation for the circuit in fig-2

2/2

a. $Y = \frac{R_1R_2U_2}{R_1+R_2} + \frac{R_2X_1}{R_1+R_2}$

b. $Y = \frac{R_1R_2U_2}{R_1+R_2} - \frac{R_2X_1}{R_1+R_2}$

c. $Y = \frac{R_1R_2U_2}{R_1+1} + \frac{X_1}{R_1+1}$

d. $Y = \frac{(R_1+R_2)U_2}{R_1R_2} + \frac{R_2X_1}{R_1R_2}$

$Y =$ $U_2 = R_1I_1$

$Y = R_2I_2 + X_1$

$R_2U_2 + X_1$

$R = \frac{R_1+R_2}{R_1R_2} \Rightarrow R_1 =$

4. write the first loop equation for given circuit

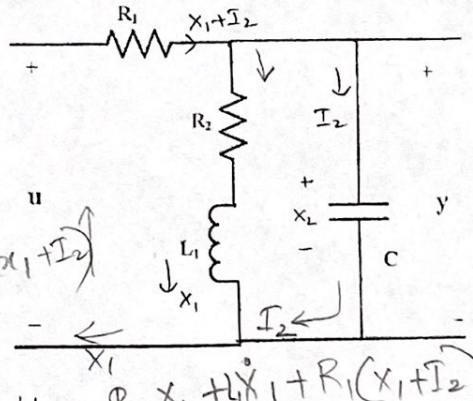
2/2

a. $U = R_1(X_1 + I_2) + R_2X_1 + L_1\dot{X}_1$

b. $U = R_1(X_1) + R_2X_1 + L_1\dot{X}_1$

c. $U = R_1(X_1) + R_2X_1 + \dot{X}_1$

d. $U = R_1(X_1 + I_2) + X_1$




5. Write the output equation for the given circuit

2/2

a. $y = X_2$

b. $y = R_2X_1 + L_1\dot{X}_1$

c. $y = R_2X_1 + L_1X_1$

d. $y = R_2X_1 + L_1\dot{X}_1 + X_2$

Please show your work for partial credit.
Each question worth 2 points; this quiz worth 2 % of your final grade.