$$J\ddot{q} + K\dot{q} + mga\cos(q) = \tau \quad , \quad a = \frac{l}{2} \quad , J = \frac{4}{3}ma^2$$

$$J\dot{x}_2 + Kx_2 + mga\cos(x_1) = \tau$$

$$\downarrow$$

$$\begin{cases} \dot{x}_1 = x_2 \\ \dot{x}_2 = \frac{1}{J}\left(\tau - Kx_2 - mga\cos(x_1)\right) \end{cases}$$

$$\downarrow$$

$$\begin{cases} \dot{x}_1 = 0x_1 + x_2 + 0\tau \\ x_2 = -\frac{mga}{J}\cdot\cos(x_1) - \frac{K}{J}x_2 + \tau \end{cases}$$

$$\downarrow$$

A

$$\begin{bmatrix} 0 & 1 \\ \frac{-mga\cos(x_1)}{J} & -\frac{K}{J} \end{bmatrix}$$

B

$$\begin{bmatrix} 0 \\ \frac{1}{J} \end{bmatrix}$$

C

$$\begin{bmatrix} 1 & 0 \end{bmatrix}$$

D

$$\begin{bmatrix} 0T \end{bmatrix}$$

$$L\ddot{q} + R\dot{q} + \frac{1}{C}q = E$$

$$L\dot{x}_2 + Rx_2 + \frac{1}{C}x_1 = E$$

$$\downarrow$$

$$\begin{cases} \dot{x}_1 = x_2 \\ \dot{x}_2 = \frac{1}{L}\left(E - \frac{1}{C}x_1 - Rx_2\right) \end{cases}$$

$$\downarrow$$

$$\begin{cases} x_1 = 0x_1 + x_2 + 0E \\ x_2 = -\frac{1}{LC}x_1 - \frac{R}{L}x_2 + \frac{1}{L}E \end{cases}$$

$$\downarrow$$

A

$$\begin{bmatrix} 0 & 1 \\ -\frac{1}{LC} & -\frac{R}{L} \end{bmatrix}$$

B

$$\begin{bmatrix} 0 \\ \frac{1}{L} \end{bmatrix}$$

C

$$\begin{bmatrix} 1 & 0 \end{bmatrix}$$

D

$$\begin{bmatrix} 0 \end{bmatrix}$$

$$\tau^2\ddot{y} + 2\varepsilon\tau\dot{y} + y = x$$

$$\tau^2\dot{x}_2 + 2\varepsilon\tau x_2 + x_1 = x$$

$$\downarrow$$

$$\begin{cases} \dot{x}_1 = x_2 \\ \dot{x}_2 = \frac{1}{\tau^2}(x - x_1 - 2\varepsilon\tau x_2) \end{cases}$$

$$\downarrow$$

$$\begin{cases} \dot{x}_1 = 0x_1 + x_2 + 0x \\ x_2 = \frac{1}{\tau^2}x_1 - 2\varepsilon\tau x_2 + \frac{1}{\tau^2}x \end{cases}$$

$$\downarrow$$

A

$$\begin{bmatrix} 0 & 1 \\ \frac{1}{\tau^2} & -2\varepsilon\tau \end{bmatrix}$$

B

$$\begin{bmatrix} 0 \\ \frac{1}{\tau^2} \end{bmatrix}$$

C

$$\begin{bmatrix} 1 & 0 \end{bmatrix}$$

D

$$\begin{bmatrix} 0 \end{bmatrix}$$