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Subject	Differential equations
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quiz	1

Solve system of equation:-

$$\begin{aligned}
 x + 3y + 5z + 2t &= 2 && \text{--- (i)} \\
 -y + 3z + 4t &= 0 && \text{--- (ii)} \\
 2x + y + 9z + 6t &= -3 && \text{--- (iii)} \\
 3x + 2y + 4z + 8t &= -1 && \text{--- (iv)}
 \end{aligned}$$

Solution:-

$$\left[\begin{array}{cccc|c}
 1 & 3 & 5 & 2 & 2 \\
 0 & -1 & 3 & 4 & 0 \\
 2 & 1 & 9 & 6 & -3 \\
 3 & 2 & 4 & 8 & -1
 \end{array} \right] \begin{array}{l} R_3 - 2R_1 \\ R_4 - 3R_1 \end{array}$$

$$\left[\begin{array}{cccc|c}
 1 & 3 & 5 & 2 & 2 \\
 0 & -1 & 3 & 4 & 0 \\
 0 & -5 & -1 & 2 & 0 \\
 0 & -7 & -11 & 2 & -7
 \end{array} \right] \begin{array}{l} -1 \cdot R_3 \\ -1 \cdot R_4 \end{array}$$

$$\left[\begin{array}{cccc|c}
 1 & 3 & 5 & 2 & 2 \\
 0 & -1 & 3 & 4 & 0 \\
 0 & 5 & 1 & -2 & 7 \\
 0 & 7 & 11 & -2 & 7
 \end{array} \right] \begin{array}{l} R_3 + 5R_2 \\ R_4 + 7R_2 \end{array}$$

$$\left[\begin{array}{cccc|c} 1 & 3 & 5 & 2 & 2 \\ 0 & -1 & 3 & 4 & 0 \\ 0 & 0 & 16 & 18 & 7 \\ 0 & 0 & 32 & 26 & -7 \end{array} \right] \quad R_4 - 2R_3$$

$$\left[\begin{array}{cccc|c} 1 & 3 & 5 & 2 & 2 \\ 0 & -1 & 3 & 4 & 0 \\ 0 & 0 & 16 & 18 & 7 \\ 0 & 0 & 0 & -10 & -7 \end{array} \right]$$

from eq (iv) $10t = 7t$, $t = 7/10$

$$t = 0.7$$

Put in eq (iii)

$$16z + 18(0.7) = 7$$

$$16z + 12.6 = 7$$

$$16z = 7 - 12.6 = -5.6$$

$$z = \frac{-5.6}{16}$$

$$z = -0.35$$

Put in eq. (ii)

$$-y + 3(-0.35) + 4(0.7) = 0$$

$$-y - 0.105 + 2.8 = 0$$

$$-y + 2.695 = 0$$

$$\boxed{y = 2.695}$$

Put in eq. (i)

$$x + 3(2.695) + 5(-0.35) + 2(0.7) = 2$$

$$x + 0.085 - 1.75 + 1.4 = 2$$

$$x + 6.335 + 1.4 = 2$$

$$x + 7.735 = 2$$

$$x + 2 - 7.735$$

$$\boxed{x = -5.735}$$

Ans