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∴ The soln of the given system of equations are -

$$\left. \begin{aligned} x &= 2+k \\ y &= -1-2k \\ z &= k \end{aligned} \right\}, \text{ where } k \text{ is any real.}$$

req: → Express the following system of equations in the matrix form $Ax=B$ and examine if the system has a unique solution:

$$4x_1 + 3x_2 + 2x_3 + 7 = 0$$

$$2x_1 + x_2 - 4x_3 + 1 = 0$$

$$x_1 - 7x_3 - 2 = 0.$$

Soln: The given system of equations are -

$$4x_1 + 3x_2 + 2x_3 + 7 = 0 \quad -7$$

$$2x_1 + x_2 - 4x_3 + 1 = 0 \quad -1$$

$$x_1 + 0x_2 - 7x_3 = 2$$

The above equation can be written in matrix form

$$\text{as - } \begin{bmatrix} 4x_1 + 3x_2 + 2x_3 \\ 2x_1 + x_2 - 4x_3 \\ x_1 + 0x_2 - 7x_3 \end{bmatrix} = \begin{bmatrix} -7 \\ -1 \\ 2 \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} 4 & 3 & 2 \\ 2 & 1 & -4 \\ 1 & 0 & -7 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} -7 \\ -1 \\ 2 \end{bmatrix}$$

$$\Rightarrow Ax = B$$

$$\text{where, } A = \begin{bmatrix} 4 & 3 & 2 \\ 2 & 1 & -4 \\ 1 & 0 & -7 \end{bmatrix}, \quad X = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}, \quad B = \begin{bmatrix} -7 \\ -1 \\ 2 \end{bmatrix}$$

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Ans: We have,

$$|A| = \begin{vmatrix} 4 & 3 & 2 \\ 2 & 1 & -4 \\ 1 & 0 & -7 \end{vmatrix}$$

$$= 4(-7-0) - 3(-14+4) + 2(0-1)$$

$$= -28 + 30 - 2 = 0.$$

Since, $|A|=0$, therefore the given system of eqⁿ has no unique solution.

[Faint handwritten notes and diagrams are visible in the background, including a matrix representation of a system of equations and some algebraic steps.]