

If the system of linear equations $2x + 3y - z = 0$; $x + ky - 2z = 0$ &

$2x - y + z = 0$, has a non – trivial solution (x, y, z) , then $\frac{x}{y} + \frac{y}{z} + \frac{z}{x} + k$ is equal to :

JEE MAIN Apr 2019

Solution:

$$\left. \begin{array}{l} 2x + 3y - z = 0 \\ x + ky - 2z = 0 \\ 2x - y + z = 0 \end{array} \right\} \text{non – trivial solution } \frac{x}{y} + \frac{y}{z} + \frac{z}{x} + k = ?$$

For non – trivial solution : $\Delta = 0$

$$\begin{vmatrix} 2 & 3 & -1 \\ 1 & k & -2 \\ 2 & -1 & 1 \end{vmatrix} = 0 \quad \begin{array}{l} R_1 \rightarrow R_1 - 2R_2 \\ R_3 \rightarrow R_3 - 2R_2 \end{array} \Rightarrow \begin{vmatrix} 0 & 3 - 2k & 3 \\ 1 & k & -2 \\ 0 & -1 - 2k & 5 \end{vmatrix} = 0$$

$$\Rightarrow -1(15 - 2k + 3 + 6k) = 0 \Rightarrow 18 - 4k = 0$$

$$\Rightarrow k = \frac{9}{2}$$

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|---|----------------|
| A | $\frac{1}{2}$ |
| B | $\frac{3}{4}$ |
| C | $-\frac{1}{4}$ |
| D | -4 |