4) Let the system of linear equations

$$4x+\lambda y+2z=0$$

$$2x-y+z=0$$

$$\mu x+2y+3z=0,\ \lambda,\mu\in\mathbb{R}$$

has a non-trivial solution. Then which of the following is true?

[Main March 18, 2021 (II)]

(a) $\mu=-6, \lambda\in\mathbb{R}$ (b) $\lambda=3, \mu\in\mathbb{R}$

(c) $\mu=6, \lambda\in\mathbb{R}$ (d) $\lambda=2, \mu\in\mathbb{R}$

Solution: (c) For non-trivial solution

$$\begin{vmatrix} 4 & \lambda & 2 \\ 2 & -1 & 1 \\ \mu & 2 & 3 \end{vmatrix}=0$$

$$\Rightarrow \mu\lambda+2\mu-6\lambda-12=0$$

$$\Rightarrow (\lambda+2)(\mu-6)=0$$

$$\Rightarrow \lambda=-2 \text{ or } \mu=6.$$