classmate

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CO-ORD. OF VECTORS.

Let $V(F)$ be F.D. V.S. and $B = \{x_1, x_2, \ldots, x_n\}$ is an ordered basis. If $x \in V$ can be written as

$$x = \alpha_1 x_1 + \alpha_2 x_2 + \ldots + \alpha_n x_n$$

Then, $(\alpha_1, \alpha_2, \ldots, \alpha_n) \rightarrow$ CO-ORD. of the vector 'x' w.r.t to basis B.

Eg: Let $V(\mathbb{R}) = \mathbb{R}^3(\mathbb{R})$ be a V.S. and $B = \{(1,0,0),(0,1,0),(0,0,1)\}$

$B_1 = \{(1,0,0), (1,1,0), (1,1,1)\}$ are two ordered basis. Then, co-ord. of vector $(1,7,5) \in V$ w.r.t basis B and B_1 resp. are ?

$$(1,7,5) = 1(1,0,0) + 7(0,1,0) + 5(0,0,1)$$

$(1,7,5)$ is a CO-ORD. w.r.t B.

$$(1,7,5) = \alpha(1,0,0) + \beta(1,1,0) + \gamma(1,1,1)$$

$$\alpha + \beta + \gamma = 1 \qquad \alpha = -6$$
$$\beta + \gamma = 7 \Rightarrow \beta = 2$$
$$\gamma = 5$$

$\therefore$ $(-6, 2, 5)$ is the CO-ORD. w.r.t. Basis B_1

Quest. Let K be a subfield of Field F. s.t. $|F| = 7^6$ and $|K| = 7^2$. If $F(K)$ be a V.S. Then,

(A) $\dim(F) = 1$

✓(B) $\dim(F) = 3$

(C) $\dim(F) = 7$

(D) $\dim(F) = 7^2$

$$|V| = |F|^{\dim V}$$
$$|V| = (7^2)^{\dim V}$$
$$7^6 = (49)^{\dim V}$$
$$(49)^3 = (49)^{\dim V}$$
$$\Rightarrow \dim V = 3$$
i.e. $\boxed{\dim F = 3}$