

$$\boxed{y = b - c} \quad , \quad \boxed{z = a - b}$$

$$T(1, 1, 1) = (3, -3, 3) = \cancel{3}(1, 1, 1) + (-6)(1, 1, 0) + \cancel{6}(1, 0, 0)$$

$$T(1, 1, 0) = (2, -3, 3) = \cancel{3}(1, 1, 1) + \cancel{(-6)}(1, 1, 0) + 5(1, 0, 0)$$

$$T(1, 0, 0) = (0, 1, 3) = \cancel{3}(1, 1, 1) + \cancel{(-2)}(1, 1, 0) + \cancel{(-1)}(1, 0, 0)$$

Hence Matrix of T w.r.t B'

$$[T : B'] = \begin{bmatrix} 3 & 3 & 3 \\ -6 & -6 & -2 \\ 6 & 5 & -1 \end{bmatrix} \quad \underline{\text{Ans.}}$$

Let $\alpha = (a, b, c) \in V_3(R)$ then

$$\Rightarrow (a, b, c) = c(1, 1, 1) + (b - c)(1, 1, 0) + (a - b)(1, 0, 0)$$

$$\Rightarrow [\alpha ; B'] = \begin{bmatrix} c \\ b - c \\ a - b \end{bmatrix}$$

Similarly,

$$\begin{aligned} T(\alpha) &= T(a, b, c) \\ &= (2b + c, a - 4b, 3a) \end{aligned}$$