rotated value where $S_x = 0.25$, $S_y = 0.75$, $S_z = 0.5$

iii) After that translate the scaled value where $t_x = 10$, $t_y = 15$, $t_z = 30$.

Solution: i) Here, P(21, 35, 49, 7) or P(3, 5, 7, 1)

$$\begin{bmatrix} x' \\ y' \\ z' \\ w' \end{bmatrix} = \begin{bmatrix} \cos 90 & -\sin 90 & 0 & 0 \\ \sin 90 & \cos 90 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 3 \\ 5 \\ 7 \\ 1 \end{bmatrix} = \begin{bmatrix} -5 \\ 3 \\ 7 \\ 1 \end{bmatrix}$$

∴ After rotate the point is (-5, 3, 7, 1)

ii) $$\begin{bmatrix} x'' \\ y'' \\ z'' \\ w'' \end{bmatrix} = \begin{bmatrix} 0.25 & 0 & 0 & 0 \\ 0 & 0.75 & 0 & 0 \\ 0 & 0 & 0.5 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} -5 \\ 3 \\ 7 \\ 1 \end{bmatrix} = \begin{bmatrix} -1.25 \\ 2.25 \\ 3.5 \\ 1 \end{bmatrix}$$

∴ After scale the point is (-1.25, 2.25, 3.5, 1)

iii) $$\begin{bmatrix} x''' \\ y''' \\ z''' \\ w''' \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 10 \\ 0 & 1 & 0 & 15 \\ 0 & 0 & 1 & 30 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} -1.25 \\ 2.25 \\ 3.5 \\ 1 \end{bmatrix} = \begin{bmatrix} 8.75 \\ 17.25 \\ 33.5 \\ 1 \end{bmatrix}$$

∴ After translate the point is (8.75, 17.25, 33.5, 1)

4) i) Using 4x4 matrices calculate the scaled value of the given homogenous co-ordinate P(15, 35, 95, 5) where $S_x = 2$, $S_y = 0.5$, $S_z = 0.25$

ii) Now calculate the rotated value of the scaled co-ordinate around x-axis where $\theta_x = 30°$

iii) After that calculate the translated value of the rotated co-ordinate where $t_x = 15$, $t_y = 5$, $t_z = \sqrt{5}$