ID: U402-47-18-003

Ans. to the Question no-1

Here, $P(75, 50, 110, 5)$ or $(15, 10, 22, 1)$

(i)

$$\begin{bmatrix} x' \\ y' \\ z' \\ w' \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 10 \\ 0 & 1 & 0 & 5 \\ 0 & 0 & 1 & 13 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 15 \\ 10 \\ 22 \\ 1 \end{bmatrix} = \begin{bmatrix} 15+10 \\ 10+5 \\ 22+13 \\ 1 \end{bmatrix} = \begin{bmatrix} 25 \\ 15 \\ 35 \\ 1 \end{bmatrix}$$

∴ After translation the point is $(25, 15, 35, 1)$

(ii)

$$\begin{bmatrix} x'' \\ y'' \\ z'' \\ w'' \end{bmatrix} = \begin{bmatrix} 2 & 0 & 0 & 0 \\ 0 & 0.5 & 0 & 0 \\ 0 & 0 & 3 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 25 \\ 15 \\ 35 \\ 1 \end{bmatrix} = \begin{bmatrix} 50 \\ 7.5 \\ 105 \\ 1 \end{bmatrix}$$

∴ After scale the point is $(50, 7.5, 105, 1)$

(iii)

$$\begin{bmatrix} x''' \\ y''' \\ z''' \\ w''' \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & \cos 60 & -\sin 60 & 0 \\ 0 & \sin 60 & \cos 60 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 50 \\ 7.5 \\ 105 \\ 1 \end{bmatrix}$$

$$= \begin{bmatrix} 50 \\ -87.18 \\ 58.995 \\ 1 \end{bmatrix}$$

∴ After Rotate the point is $(50, -87.18, 58.995, 1)$

Ans. to the Question no-2

Here,

$P(9, 18, 27, 3)$ on $(3, 6, 9, 1)$

(i)
$$\begin{bmatrix} x' \\ y' \\ z' \\ w' \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 4 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 3 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 3 \\ 6 \\ 9 \\ 1 \end{bmatrix} = \begin{bmatrix} 7 \\ 8 \\ 12 \\ 1 \end{bmatrix}$$

∴ After translation the point is $(7, 8, 12, 1)$

(ii)
$$\begin{bmatrix} x'' \\ y'' \\ z'' \\ w'' \end{bmatrix} = \begin{bmatrix} 2 & 0 & 0 & 0 \\ 0 & 0.5 & 0 & 0 \\ 0 & 0 & 4 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 7 \\ 8 \\ 12 \\ 1 \end{bmatrix} = \begin{bmatrix} 14 \\ 4 \\ 48 \\ 1 \end{bmatrix}$$

∴ After scale the point is $(14, 4, 48, 1)$

(iii)
$$\begin{bmatrix} x''' \\ y''' \\ z''' \\ w''' \end{bmatrix} = \begin{bmatrix} \cos 30 & -\sin 30 & 0 & 0 \\ \sin 30 & \cos 30 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 14 \\ 4 \\ 48 \\ 1 \end{bmatrix}$$

$$= \begin{bmatrix} 10.12 \\ 10.46 \\ 48 \\ 1 \end{bmatrix}$$

∴ After Rotate the point is $(10.12, 10.46, 48, 1)$

Ans. to the Question no — 3

Here, $P(12, 36, 24, 4)$ on $(3, 9, 6, 1)$

(i)
$$\begin{bmatrix} x' \\ y' \\ z' \\ w' \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 3 \\ 9 \\ 6 \\ 1 \end{bmatrix} = \begin{bmatrix} 5 \\ 12 \\ 7 \\ 1 \end{bmatrix}$$

∴ After translation the point in $(5, 12, 7, 1)$

(ii)
$$\begin{bmatrix} x'' \\ y'' \\ z'' \\ w'' \end{bmatrix} = \begin{bmatrix} 2 & 0 & 0 & 0 \\ 0 & 0.5 & 0 & 0 \\ 0 & 0 & 3 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 5 \\ 12 \\ 7 \\ 1 \end{bmatrix} = \begin{bmatrix} 10 \\ 6 \\ 21 \\ 1 \end{bmatrix}$$

∴ After scale the point in $(10, 6, 21, 1)$

(iii)
$$\begin{bmatrix} x''' \\ y''' \\ z''' \\ w''' \end{bmatrix} = \begin{bmatrix} \cos 60 & 0 & -\sin 60 & 0 \\ 0 & 1 & 0 & 0 \\ \sin 60 & 0 & \cos 60 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \cdot \begin{bmatrix} 10 \\ 6 \\ 21 \\ 1 \end{bmatrix}$$

$$= \begin{bmatrix} -13.18 \\ 6 \\ 19.16 \\ 1 \end{bmatrix}$$

∴ After Rotate the point in $(-13.19, 6, 19.16, 1)$

Ans. to the Question no - 4

Here, $P(63, 99, 117, 9)$ or $(7, 11, 13, 1)$

(i)
$$\begin{bmatrix} x' \\ y' \\ z' \\ w' \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 8 \\ 0 & 1 & 0 & 49 \\ 0 & 0 & 1 & 32 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 7 \\ 11 \\ 13 \\ 1 \end{bmatrix} = \begin{bmatrix} 15 \\ 60 \\ 45 \\ 1 \end{bmatrix}$$

∴ After translation the point is $(15, 60, 45, 1)$

(ii)
$$\begin{bmatrix} x'' \\ y'' \\ z'' \\ w'' \end{bmatrix} = \begin{bmatrix} 3 & 0 & 0 & 0 \\ 0 & 0.5 & 0 & 0 \\ 0 & 0 & 5 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 15 \\ 60 \\ 45 \\ 1 \end{bmatrix} = \begin{bmatrix} 45 \\ 30 \\ 225 \\ 1 \end{bmatrix}$$

∴ After scale the point is $(45, 30, 225, 1)$

(iii)
$$\begin{bmatrix} x''' \\ y''' \\ z''' \\ w''' \end{bmatrix} = \begin{bmatrix} \cos 30 & 0 & -\sin 30 & 0 \\ 0 & 1 & 0 & 0 \\ \sin 30 & 0 & \cos 30 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 45 \\ 30 \\ 225 \\ 1 \end{bmatrix}$$

$$= \begin{bmatrix} -73.52 \\ 30 \\ 217.35 \\ 1 \end{bmatrix}$$

∴ After Rotate the point is $(-73.52, 30, 217.35, 1)$