Assignment

Here,

$$P(75, 50, 110, 5) \text{ or } (15, 10, 22, 1)$$

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)
$$\begin{bmatrix} x'' \\ y'' \\ z'' \\ w'' \end{bmatrix} = \begin{bmatrix} 2 & 0 & 0 & 0 \\ 0 & 0.5 & 0 & 0 \\ 6 & 0 & 3 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 25 \\ 15 \\ 35 \\ 1 \end{bmatrix} = \begin{bmatrix} 50 \\ 7.5 \\ 105 \\ 1 \end{bmatrix}$$

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

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

$$= \begin{bmatrix} 50 \\ 3.75 - 90.933 \\ 6.495 + 52.5 \\ 1 \end{bmatrix}$$

$$= \begin{bmatrix} 50 \\ -87.183 \\ 58.995 \\ 1 \end{bmatrix}$$

After Rotate the point is $(50, -87.183, 58.995, 1)$

Ans to the Que : 02

Here, $p(9, 18, 27, 3)$ or $(3, 6, 9, 1)$

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) $\begin{bmatrix} x''' \\ y''' \\ z''' \\ w''' \end{bmatrix} = \begin{bmatrix} Cos\,30 & Sin\,30 & 0 & 0 \\ Sin\,30 & Cos\,30 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 14 \\ 4 \\ 48 \\ 1 \end{bmatrix}$

$= \begin{bmatrix} 12.12 + (-2) \\ 7 + 3.96 \\ 48 \\ 1 \end{bmatrix} = \begin{bmatrix} 10.12 \\ 10.96 \\ 48 \\ 1 \end{bmatrix}$

After Rotate the point is $(10.12, 10.96, 48,$

Ans to the Que : 03

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

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 is $(5, 12, 7, 1)$

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 is $(10, 6, 21, 1)$

(iii)
$$\begin{bmatrix} x''' \\ y''' \\ z''' \\ w''' \end{bmatrix} = \begin{bmatrix} \cos 60 & 0 & -\sin 60 & 0 \\ 0 & 1 & 0 & 0 \\ \sin 60 & 0 & \cos 60 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 16 \\ 6 \\ 21 \\ 1 \end{bmatrix}$$

$$= \begin{bmatrix} 5 - 18.19 \\ 6 \\ 8.66 + 10.5 \\ 1 \end{bmatrix}$$

$$= \begin{bmatrix} -13.19 \\ 6 \\ 19.16 \\ 1 \end{bmatrix}$$

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

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

$= \begin{bmatrix} 45 \\ 36 \\ 225 \\ 1 \end{bmatrix}$

After scale the point is $(45, 36, 225, 1)$

iii)

$$\begin{bmatrix} x''' \\ y''' \\ z''' \\ w''' \end{bmatrix} = \begin{bmatrix} \cos 30 & 0 & -\sin 30 & 0 \\ 0 & 1 & 0 & 0 \\ \sin 30 & 0 & \cos 30 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 45 \\ 36 \\ 225 \\ 1 \end{bmatrix}$$

$$= \begin{bmatrix} 38.97 + (-112.5) \\ 36 \\ 22.5 + 194.86 \\ 1 \end{bmatrix}$$

$$= \begin{bmatrix} -73.53 \\ 30 \\ 217.36 \\ 1 \end{bmatrix}$$

∴ Aften Rotate the point is $(-73.53, 30, 217, 36, 1)$