

Q1

Ans to the Q NO - 1

Given,

$$x = -8$$

$$y = 4$$

$$v = \begin{bmatrix} x \cos \phi \\ x \sin \phi \end{bmatrix}$$

$$v' = \begin{bmatrix} x \cos (\phi - \theta) \\ x \sin (\phi - \theta) \end{bmatrix}$$

$$\Rightarrow x' = x \frac{\cos \phi}{x} \cos \theta + x \left(\frac{\sin \phi}{y} \sin \theta \right)$$

$$y' = x \frac{\sin \phi}{y} \cos \theta - x \frac{\cos \phi}{x} \sin \theta$$

$$\therefore x' = x \cos \theta + y \sin \theta$$

$$y' = x \sin \theta - y \cos \theta$$

$$\begin{bmatrix} x' \\ y' \end{bmatrix} = \begin{bmatrix} \cos \theta & \sin \theta \\ \sin \theta & -\cos \theta \end{bmatrix} \begin{bmatrix} -8 \\ 4 \end{bmatrix}$$

$$= \begin{bmatrix} \cos 90 & \sin 90 & 0 \\ \sin 90 & -\cos 90 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} -8 \\ 4 \\ 1 \end{bmatrix}$$

$$= \begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} -8 \\ 4 \\ 1 \end{bmatrix}$$

$$x' = 0(-8) + 4 + 0 = 4$$

$$y' = -8 + (0 \cdot 4) + (0 \cdot 1) = -8$$

$$\therefore (x', y') = (4, -8)$$

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$$x = x'$$

$$y = y'$$

$$(x, y) = (4, -8)$$

⑥ Reflection By Y Axis :-

$$x = 4$$

$$y = -8$$

$$\therefore x' = -x$$

$$\therefore y' = y$$

homogenous:

$$\begin{bmatrix} x' \\ y' \\ w \end{bmatrix} = \begin{bmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 4 \\ -8 \\ 1 \end{bmatrix}$$

$$\therefore x' = -4$$

$$y' = -8$$

$$\therefore (x', y') = (-4, -8)$$

Shear in x-direction

$$x = -4$$

$$y = -8$$

$$x' = x + a$$

$$= x + y \tan \theta$$

$$= x + y \tan \alpha (45)$$

$$y' = y$$

$$\begin{bmatrix} x' \\ y' \\ w \end{bmatrix} = \begin{bmatrix} 1 & \tan 45 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} -4 \\ -8 \\ 1 \end{bmatrix}$$

$$\therefore x' = (-4) + 1(-8) + 0 \quad [\because \tan 45 = 1]$$
$$= -12$$

$$\therefore y' = 0 + (-8) + 0$$
$$= -8$$

$$\therefore (x', y') = (-12, -8)$$

Ans