Question ①
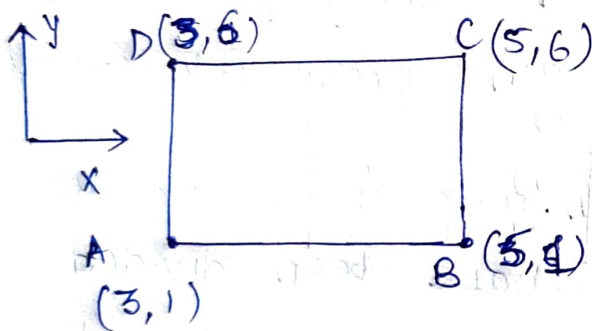
figure a.   Semi- Immersive.

figure b.   Immersive .(Fully).

Question ②

shearing factor (2,3).

$$\begin{bmatrix} X_{new} \\ Y_{new} \\ 1 \end{bmatrix} = \begin{bmatrix} 1 & shy & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} X_{old} \\ Y_{old} \\ 1 \end{bmatrix}$$

For y-shearing

for A(3,1)

$X_{new\,A} = X_{old\,A} = 3$, $Y_{new\,A} = Y_{old\,A} + shy \ast X_{old\,A}$

$$= 1 + 3 \times 3 = 10$$

$(X_{Anew}, Y_{Anew}) = (3,10)$

for B(5,1)

$X_{new\,B} = 5$. $Y_{Bnew} = 1 + 5 \times 3 = 16$

$(X_{Bnew}, Y_{new\,B}) = (5,16)$

for c(5,6)

$$X_{c \, new} = 5 \quad , \quad Y_{c \, new} = 6 + 3 \times 5 = 21$$

$$(X_{c \, new}, Y_{c \, new}) = (5, 21)$$

for D(3,6)

$$X_{D \, new} = 3 \quad , \quad Y_{D \, new} = 6 + 3 * 3 = 15$$

Y-sheared of the rectangle
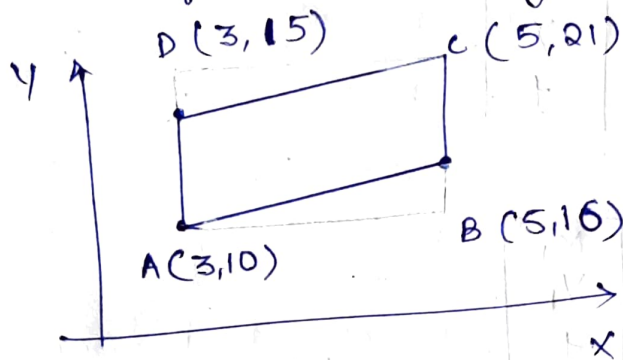
Question. 7:

(a) translation: pupil (object name)

(b) rotation: earth (object name)

Question. 5

a) cuboid.

b) sphere.

Question 10

If we consider a point $P(x,y)$

So, in the case 1 :

Reflection about y-axis and the reflection about $y=-x$ will give

$$P_1 = \begin{bmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ 1 \end{bmatrix}$$

$$P_2 = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ y_1 \\ 1 \end{bmatrix}$$

So,
$$\begin{bmatrix} x_2 \\ y_2 \\ 1 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ 1 \end{bmatrix}$$

$$\begin{bmatrix} x_2 \\ y_2 \\ 1 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ 1 \end{bmatrix}$$

Case 2 : Rotation about $270°$ in anti-clockwise direction $\theta = 270°$

$\cos 270° = 0$
$\sin 270° = -1$

$$\begin{bmatrix} x' \\ y' \\ 1 \end{bmatrix} = \begin{bmatrix} \cos\theta & -\sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ 1 \end{bmatrix}$$

$$\begin{bmatrix} x' \\ y' \\ 1 \end{bmatrix} = \begin{bmatrix} 0 & +1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ 1 \end{bmatrix}.$$

so, these are the final matrix in both the cases.

hence, we can say given statement is true.

Question ⑨

DOF of the video : DOF Reality P6 motion simulator, flight sim.

is | DOF = 6 |.

1) forward movement
2) backward movement } surge

3) upward movement
4) downward movement } heave

5) leftward movement
6) rightward movement } sway,

7) Rotation about normal axis. : yaw.
8) Rotation about transvers axis. : pitch
9) Rotation about longitudinal axis. : Roll

Question ③

Steps in transformation of 3D-coordinates

(i) **Modelling transformation**

Its an autmated way of modifying and creating models.

(ii) **Viewing transformation**

Its is the mapping of coordinates of points and lines that form the picture into appropriate coordinates on the display device

(iii) **Projection transformation**

The projection is a linear transformation P from a vector space to itself such that $P^{\wedge}\{2\} = P$.

(iv) **workstation transformation**

trans. which maps the boundary and interior of a workstation window onto the boundary & interior of workstation, Viewpoint.

Question ⑧

(a) In the Pen Plotter, **Random display** will be suitable,

As, Random display electron beam is directed only to the the area of screen where a picture has to be displayed/drawn. and its able to draw only one line at a time

(b) In Scanner, **Raster Scan display** is used. as for Scanner each pixels in a scanline is scanned and whenever the pixelvalue changes, the specific pixeles scanned. If it is using scanlines. It scans the sreen from top to bottom covering one row at a time. Its very handy in scanning lines also.

Question ⑥

An optical tracking system used here is thath it is very apparent from the sensor that can be seen is between the two people. It looks like a cursor.

Question 4

without the headset of AR/VR, its not possible to experience VR because, this devise gives an immersive experience to feel & visualize the virtual Reality.