CSE 423

Assignment.

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Section: 011.

Ans. to the ques. no-1:

4×4 translation matrix that applied on the object in Figure 1 to get that in Figure 2 is:

$$\begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

So, the coordinate of $O_1(2,3,2)$.

Ans. to the ques. no- 2:

Center of rotation, $O_1(2,3,2)$

Now, $A_1' = (A_1 - O_1) = (2,3,6) - (2,3,2)$

$$A_1' = (0,0,4)$$

$B_1' = (B_1 - O_1) = (2,7,4) - (2,3,2)$

$$B_1' = (0,4,2)$$

$C_1' = (C_1 - O_1) = (4,7,2) - (2,3,2)$

$$C_1' = (2,4,0)$$

$D_1' = (D_1 - O_1) = (4,5,6) - (2,3,2)$

$$D_1' = (2,2,4)$$

$$E_1' = (E_1 - O_1)$$
$$= (4,3,2) - (2,3,2)$$
$$E_1' = (2,0,0)$$

$$F_1' = (F_1 - O_1) = (2,3,4) - (2,3,2)$$
$$F_1' = (0,0,2)$$

$$G_1' = (G_1 - O_1) = (4,3,4) - (2,3,2)$$
$$G_1' = (2,0,2)$$

Now, rotating All from A_1' to G_1' B across 30°,

$$x' = x$$
$$y' = y\cos\theta - z\sin\theta.$$
$$z' = y\sin\theta + z\cos\theta.$$

for $A_1'(0,0,4)$, $\Rightarrow x'' = 0$

$\Rightarrow y'' = 0\cos 30^\circ - 4\sin 30^\circ = -2$

$\Rightarrow z'' = 0\sin 30^\circ + 4\cos 30^\circ = 3.46$.

$\therefore A_1''(0, -2, 3.46)$

$B_1'(0,4,2)$ $\Rightarrow x'' = 0$

$\Rightarrow y'' = 0\cos 30^\circ - 2\sin 30^\circ = 2.46$

$\Rightarrow z'' = 4\sin 30^\circ + 2\cos 30^\circ = 3.73$.

$\therefore B_1''(0, 2.46, 3.73)$

$C_1'(2,4,0)$

$x'' = 2$

$y'' = 4\cos 30^\circ - 0\sin 30^\circ = 3.46$

$z'' = 4\sin 30^\circ + 0\cos 30^\circ = 2$

$\therefore C_1''(2, 3.46, 2)$.

$D_1'(2,2,4)$.

$x'' = 2$

$y'' = 2\cos 30^\circ - 4\sin 30^\circ = -0.26$

$z'' = 2\sin 30^\circ + 4\cos 30^\circ = 4.46$

$\therefore D_1''(2, -0.26, 4.46)$

$E_1'(2,0,0)$

$x'' = 2$

$y'' = 0\cos 30^\circ - 0\sin 30^\circ = 0$

$z'' = 0\sin 30^\circ + 0\cos 30^\circ = 0$

$\therefore E_1'' = (2,0,0)$

$F_1'(0,0,2)$

$x'' = 0$

$y'' = 0\cos 30^\circ - 2\sin 30^\circ = -1$

$z'' = 0\sin 30^\circ + 2\cos 30^\circ = 1.732$

$\therefore F_1''(0, -1, 1.732)$

$G_1'(2,0,2)$.

$x'' = 2$

$y'' = 0\cos 30° - 2\sin 30° = -1$.

$z'' = 0\sin 30° + 2\cos 30° = 1.732$

$\therefore G_1''(2,-1,1.732)$.

Now,

$A_2 = (2, 1, 5.46)$

$B_2 = (2, 5.46, 5.73)$

$C_2 = (4, 6.46, 4)$

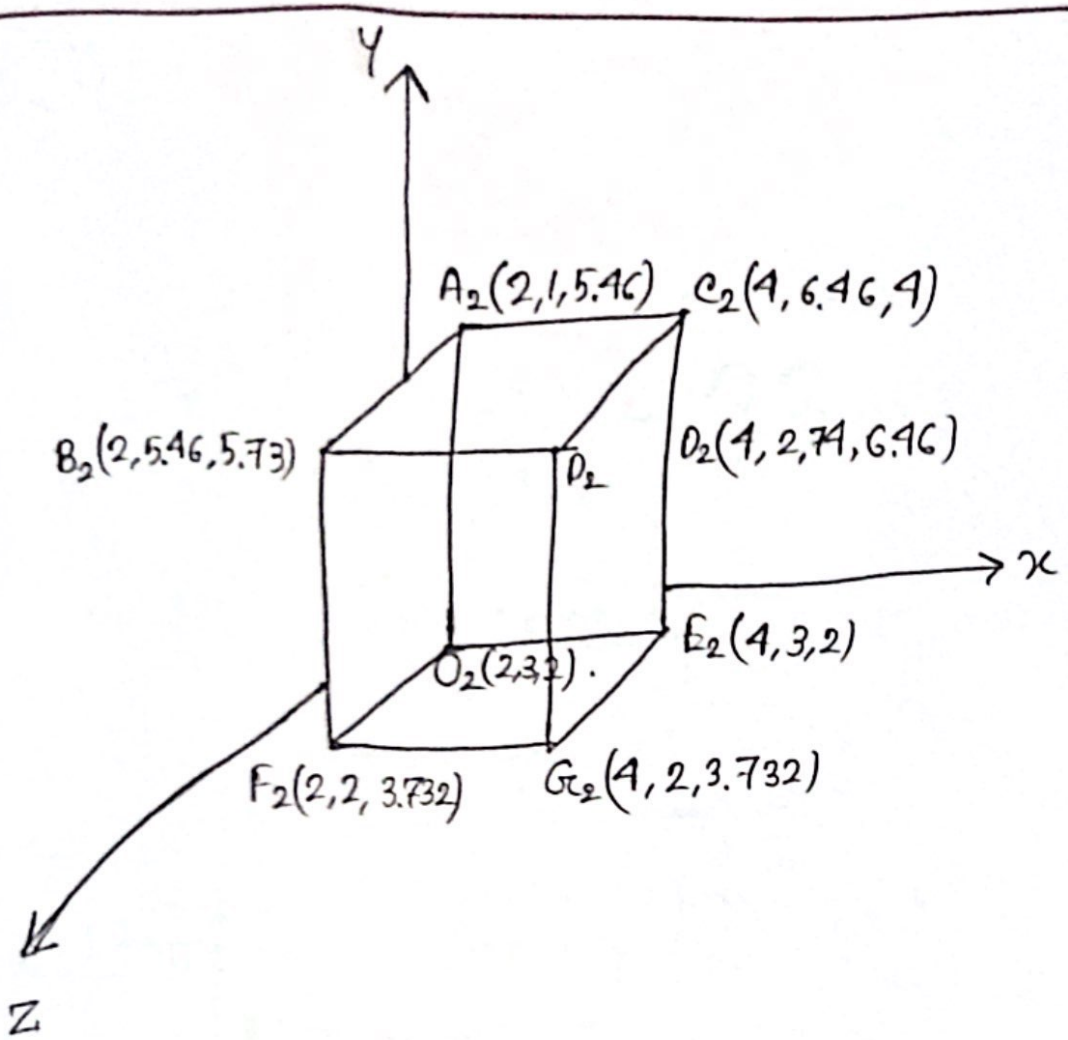
$D_2 = (4, 2.74, 6.46)$

$E_2 = (4, 3, 2)$

$F_2 = (2, 2, 3.732)$

$G_2 = (4, 2, 3.732)$

$O_2 = (2, 3, 2)$


Y
A2(2,1,5.46)
C2(4,6.46,4)
B2(2,5.46,5.73)
D2
D2(4,2,74,6.46)
X
E2(4,3,2)
O2(2,3,2)
F2(2,2,3.732)
G2(4,2,3.732)
Z