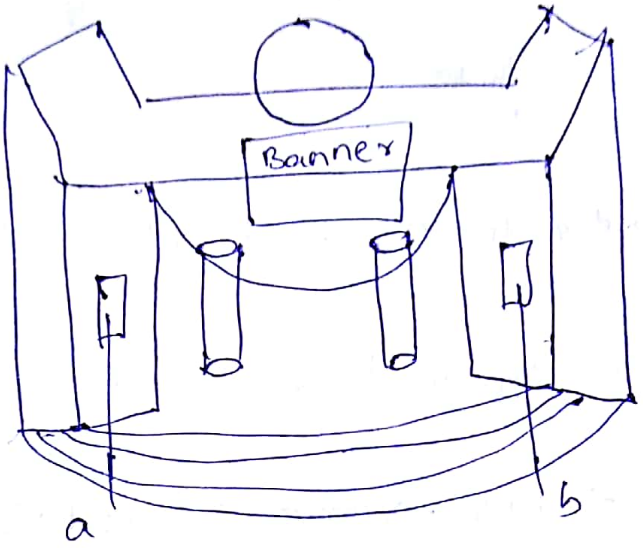
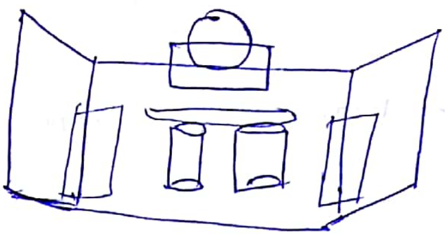
①

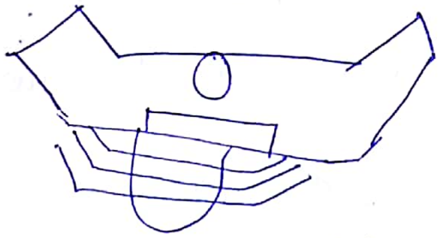


ⓐ Cylinders_ Rectangles, Spheres.

(b) Front View



Top View



ⓒ

ⓐ Create models :- Design a Sphere, two Cylinders and then 3 Rectangular Surfaces. Sphere for globe, Cylinder for beams, 2 rectangular surfaces for LED surfaces and Rectangular Surface for Banner

(b) World :- Import Each model into the world i.e., Portico and adjust its positions in accordance with Requirements and adjust the size to

Camera:- Adjust the Camera to get a Propo view and set it to a suitable position

(d) Viewport:- According to the Camera set a view port

(e) Screen:- Flush Everything to the screen.

Create Model → World → Camera → Viewport → Screen

(b) 600×60 Initiall according the question Beams are at origin

(1) ~~Son~~ Since Beam i is already at origin, we need not trans it

To get Beams to (300,200)

translate all the points in cylinder by adding $\begin{bmatrix} 300 \\ 200 \end{bmatrix}$ translation vecto

So for all p in cylinder $p' = p + T$

where $p'$ is new co-ordinates

$p$ is old co-ordinates

$T$ is translation vector.

[illegible]

(2) Translation

(3) In normal Coordinates it is as Simple as $P' = P + T$

In Homogenous Co-ordinates, it is

$$\begin{bmatrix} x' \\ y' \\ 1 \end{bmatrix} = \begin{bmatrix} 1 & 0 & tx \\ 0 & 1 & ty \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ 1 \end{bmatrix}$$

$x', y'$ are new Coordinates

$x, y$ are old Coordinates

$(tx, ty) = (300, 300)$

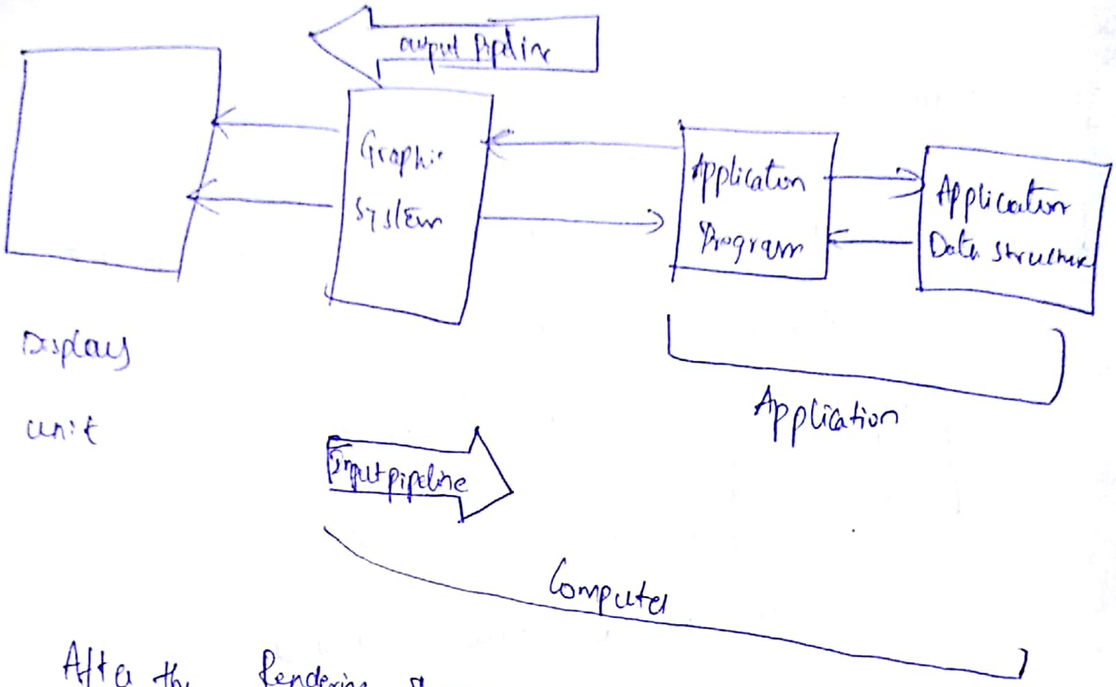
(4) Since the Camera Size is in Ratio of 1:1 it is better to choose Ratio of 1:1

Aspect Ratio ÷ Width : Height

(5) F

1. Aspect Ratio
2. Camera Position (set)
3. Depth of Field
4. Lighting & Exposure
5. Field of View

(E)



After the Rendering Process, a Vector Image is Produced which is Composed of Point and Paths Rather than Pixels. this Image Contains the Image of Building Either in top View (or) Front View Defined with all the Requirements i-e, two cylindrical Beams, Globe ~~Glo~~ and flat surface in appropriate places

(G) this can be Done by Ray tracing Path which is a - Rendering technique for Generating an Image by tracing the Path of light as Pixels in Image Plane and Simulating the Effects of the Encounters ~~with~~ With Vertical objects

(H) By using gl PushMatrix() and gl pop matrix(), we can apply Transformation on Beam 2, without Effecting Beam1 and other object. Push matrix saves the current Co-ordinate System in Stack whereas Pop matrix Restores it.

(I)

$$\begin{bmatrix} x_{world} \\ y_{world} \\ z_{world} \\ 1 \end{bmatrix} = M_{model} \cdot \begin{bmatrix} x_{object} \\ y_{object} \\ z_{object} \\ 1 \end{bmatrix}$$

Where Mmodel Performs the Appropriate Coordinate change (Rotation, translation, Scale) to each vertex

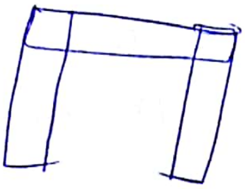
Then transform the vertices from the world space to the Eye (or) Camera Space. we need other matrix (Mview) to apply the transformation

$$\begin{pmatrix} x_{eye} \\ y_{Eye} \\ z_{eye} \\ w_{eye} \end{pmatrix} = M_{ModelView} \begin{pmatrix} x_{obj} \\ y_{obj} \\ z_{obj} \\ w_{obj} \end{pmatrix} = M_{view} M_{model} \cdot \begin{pmatrix} x_{obj} \\ y_{obj} \\ z_{obj} \\ w_{obj} \end{pmatrix}$$

Then Specify a viewing Volume (or) clipping Volume and selecting a projection model/view

(I) No, it Can't be done unless You Rasterize the Picture Because any Operation such as Color Correction, adding textures etc, Can be done only through pixels which is a Primitive of Raster picture This can be Easily found in Adobe Adobe Photoshop when you would Rasterize Picture for apply some color Correction and all.

(K) Since clipping is cutting out a portion of an object, after the clipping youn can only see Beams.



(L) when we Apply Culling to Bean 1, It has no Effect on Beam2, But Beam 1 will be Completely Excluded our Pipeline

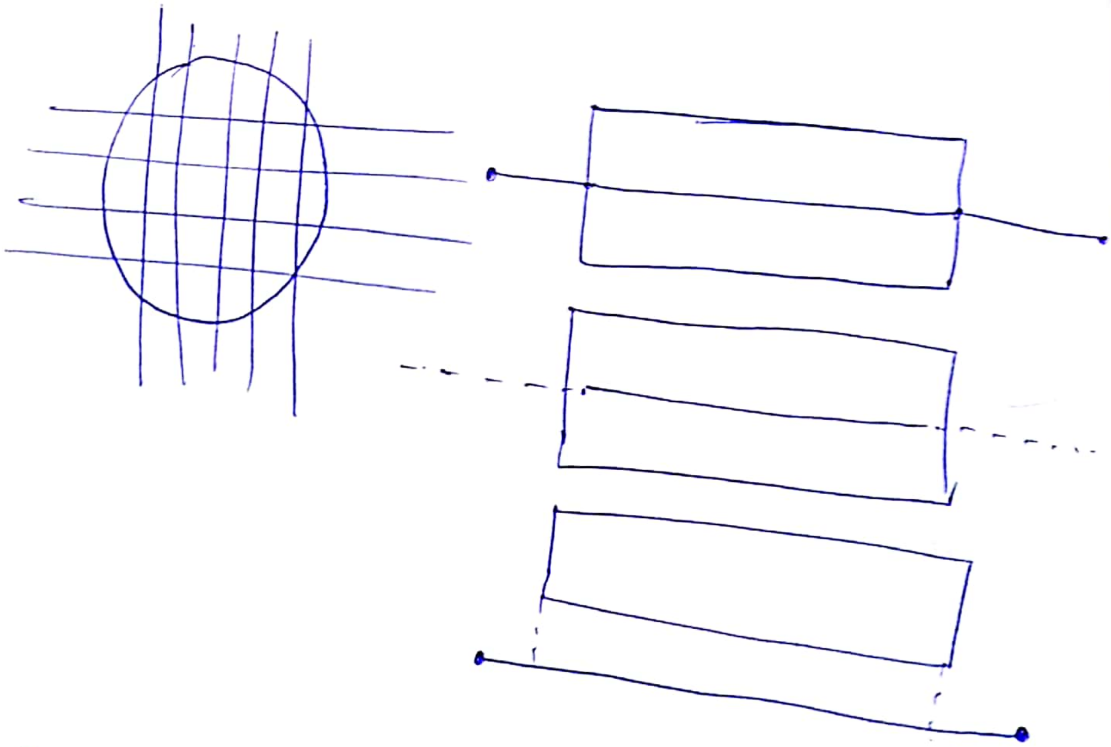
(M) ~~RGB stands for~~

P.T.O.

(M) RGB Stand for Red, Green and Blue and Ranges from 0 to 255 for R, G, & B

(i) (0,0,0) → Beams will be filled with Back color

(ii) (255, 255, 255) → Beams will be filled with white in color



Partially Visible : Both Intersect and both outside the window

(Or) One Inside the Window

Fully Visible : Both Insid the Window

Not Visible : Intersects outside Window.

(F) Sircle clipping is cutting out a portion of an Object After, clipping Beams, you can only see Beams.