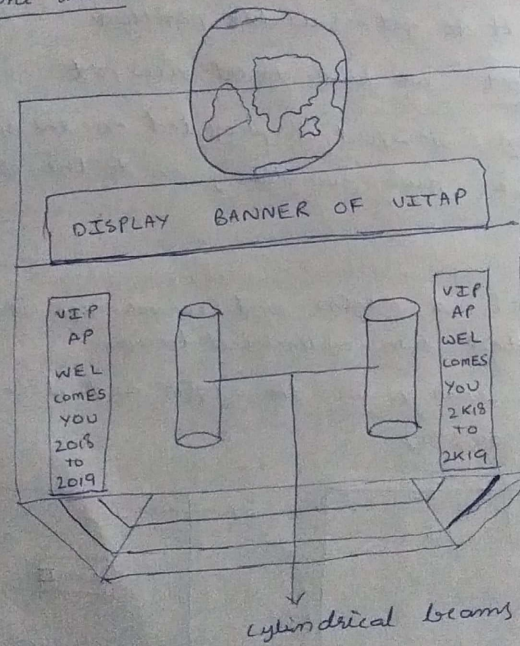M. vamshi Reddy
17BCE 7142
CSE S-3
ASSIGNMENT-2

Q1:

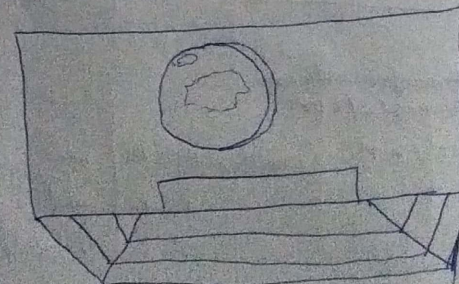a) Basic primitives:-

circle / ellipse / sphere → for Globe

Rectangles → pillars and all other items

cylinders → cylindrical beams.

b) front view:

DISPLAY   BANNER OF VITAP

VIP
AP

WEL
COMES

YOU
2018
TO
2019

VIP
AP

WEL
COMES
YOU
2K18
TO
2K19

cylindrical beams

TOP   VIEW

c) Graphical pipeline:

model → world → camera → viewport → screen

(i) model: we need a sphere, two cylinder (cylindrical beams) and 3 rectangular surfaces (① Display banner and ② Flat vertical surface to display LED's)

globe

(ii) world: Import each model into the world (surrounding) and adjust its positions in accordance to the viewer lighting effects and adjust the size of the model.

(iii) camera: camera for getting a proper view and set it to get suitable position.
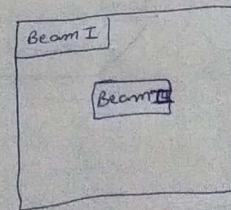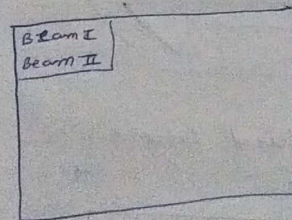
(iv) viewport: we have to set view port

(v) screen: viewport is projected on the screen. i·e push everything on to the screen.

d)
(i) Beam I, II is at origin and canvas size is of (600,600) and created two cyclindrical beams.
place beam I in the origin and place the beam2 at (300,300).

```
┌──────────────────────┐        ┌──────────────────────┐
│ ┌──────┐             │        │ ┌──────┐             │
│ │Beam I│             │        │ │Beam I│             │
│ │Beam II│            │        │ └──────┘             │
│ └──────┘             │        │         ┌──────┐     │
│                      │        │         │Beam II│    │
│                      │        │         └──────┘     │
│                      │        │                      │
└──────────────────────┘        └──────────────────────┘
```

(ii) using transformation
translation

$p' = P + T$ where, p' is new coordinates

P is old coordinates

T is translations vector

· In homogeneous coordinates it is

$$\begin{bmatrix} x' \\ y' \\ 1 \end{bmatrix} = \begin{bmatrix} 1 & 0 & t_x \\ 0 & 1 & t_y \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ 1 \end{bmatrix}$$

x', y' are new coordinates

x, y are old coordinates

(t_x, t_y), $(300, 300)$

3) $P = \begin{bmatrix} t_x \\ t_y \end{bmatrix} + \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 300 \\ 300 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \end{bmatrix} = \begin{bmatrix} 300 \\ 300 \end{bmatrix}$
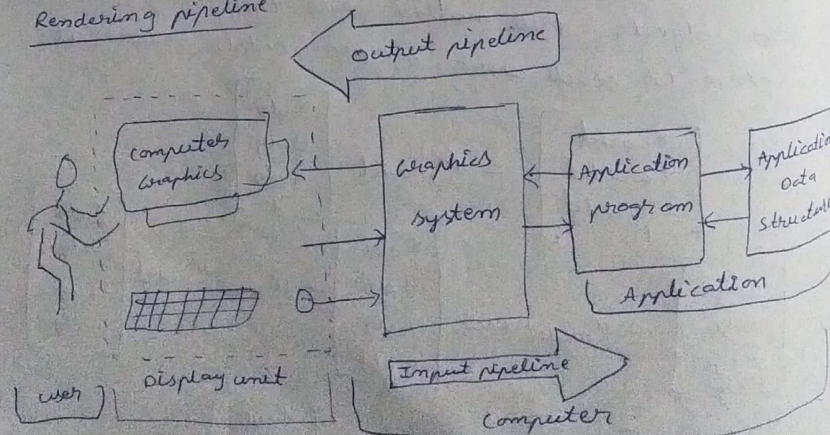
4) The size of canvas is 600, 600 and its ratio is 1:1

so, if we use 1=1 as aspect ratio it's Better.

e) Rendering pipeline

Rendering

· projection   · occulsion (lighting exposure)   · colour
· shadows   · Reflection / Refraction   · Indirect illumination

Rendering pipeline

rendering process a vector image is processed which is composed of points and paths rather than pixels this image contains the image of building with in top view or front view as defined with all the requirements.

f) (i) aspect ratio

(ii) camera position

(iii) Depth of field

(iv) Lighting & exposure

(v) Field of view

g) This can be done by ray tracing which is a rendering technique for generating an image by tracing the path or light as pixels in an image plane and simulating the effects of its inconter with vertical objects.

h) By using push matrix() and popmatrix(), we can apply on beam2 without effecting beam1 and other objects. Push matrix saves the current coordinate system in stack where as pop matrix restores it.

(i)
$$\begin{bmatrix} x\,world \\ y\,world \\ z\,world \\ 1 \end{bmatrix} = m_{model} \cdot \begin{bmatrix} x\,obj \\ y\,obj \\ z\,obj \\ 1 \end{bmatrix}$$
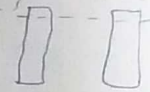
$$\begin{bmatrix} x\,eye \\ y\,eye \\ z\,eye \\ w\,eye \end{bmatrix} = m_{modelview} \begin{bmatrix} x\,obj \\ y\,obj \\ z\,obj \\ w\,obj \end{bmatrix} = m_{view} \cdot m_{model} \begin{bmatrix} x\,obj \\ y\,obj \\ z\,obj \\ w\,obj \end{bmatrix}$$

$$\begin{bmatrix} x\,clip \\ y\,clip \\ z\,clip \\ w\,clip \end{bmatrix} = m_{projection} \begin{bmatrix} x\,eye \\ y\,eye \\ z\,eye \\ w\,eye \end{bmatrix}$$

j) No, it can't be done unless you restore the picture. Because any operation such as colour correction, adding texture etc.. can be done only through pixels which is a primitive of raster picture. This can be only found in photoshop where you coould rasterise picture for applying some color correct and all.

k) since clipping is cutting a object where you want to cut and the clipped part is excluded.

l) when we apply culling to beam 1, it has no effect on beam 2 but beam 1 will be excluded out of pipeline

m) RGB stands for RED, GREEN and BLUE and rangss from 0 to 255 for R, G and B.

(i) $(0,0,0) \rightarrow$ Black colour is filled to beams

(ii) $(255,255,255) \rightarrow$ white color is filled to beams.

so, we will get black and white for values of R, G, B as mentioned above.