Prepare these questions. It will help you to solve Terminal Paper.

1. **Explain following terms**

**(A). Saturation of light.**

Saturation is the intensity of a specific hue. It is based on color’s purity. High saturated hue has intense color while less has gray color. The saturation of a color is determined by a combination of light intensity or how much it is distributed across spectrum.

**(B) RGB Color Coordinates.**

Red, Green, Blue are three colors in this system.

**(C) Resolution of Raster system.**

Total number of pixels present on a raster system called resolution of raster system.

**(D) List some 3D viewing devices.**

1. Stereoscopic systems

2. Virtual reality systems

**(E) Interpolation**.

In the context of computer animation, interpolation is filling in frames between the key frames. It typically calculates the in between frames through use of (usually) piecewise polynomial Interpolation to draw images semi-automatically.

**(F) GUI**

Graphical user interface is abbreviated GUI. GUI is a [program](http://www.webopedia.com/TERM/P/program.html)[interface](http://www.webopedia.com/TERM/I/interface.html) that takes advantage of the [computer's](http://www.webopedia.com/TERM/C/computer.html)[graphics](http://www.webopedia.com/TERM/G/graphics.html) capabilities to make the program easier to use. Well-designed graphical user interfaces can free the user from learning complex [command languages](http://www.webopedia.com/TERM/C/command_language.html). Graphical user interfaces, such as [Microsoft Windows](http://www.webopedia.com/TERM/M/Microsoft_Windows.html) and the one used by the [Apple Macintosh](http://www.webopedia.com/TERM/M/Macintosh_computer.html).

**(G) Frame Buffer**

The portion of [memory](https://www.webopedia.com/TERM/M/memory.html) reserved for holding the complete [bit-mapped](https://www.webopedia.com/TERM/B/bit_map.html)image that is sent to the monitor. Typically the frame buffer is stored in the memory [chips](https://www.webopedia.com/TERM/C/chip.html) on the [video adapter](https://www.webopedia.com/TERM/V/video_adapter.html). In some instances, however, the video [chipset](https://www.webopedia.com/TERM/C/chipset.html) is integrated into the [motherboard](https://www.webopedia.com/TERM/M/motherboard.html)design, and the frame buffer is stored in general [main memory](https://www.webopedia.com/TERM/M/main_memory.html)

**(H) Interlacing**

It is the method of incrementally displaying a visual on a CRT. On some raster scan systems, each

frame is displayed in two passes using an interlaced refresh procedure. In the first pass, the beam seeps

across every other scan line from top to bottom. Then after the vertical retrace, the beam sweeps out the

remaining scan lines.

**(I) Display controller**

A display controller is the main component of any device generating a video signal. It is an integrated circuit that produces a TV video signal in a video display system. Video display controllers generate the timing of the video signals and the blanking interval signal. A video controller chip is integrated in the main computer system logic but can also manipulate video RAM contents in an independent fashion.

There are several different kinds of display controllers. At Future Electronics we stock many of the most common types categorized by Target LCD Panels, Display Memory, Maximum Resolution, Maximum Colors/Gray Scales and Packaging Type. The parametric filters on our website can help refine your search results depending on the required specifications.

Max Resolution can be between 160 x 240 and 800 x 600. Target LCD Panels can be STN, STN & TFT or TFT. Maximum Colors/Gray Scales can be 16 Grey Scale, 256 Colors, 64K Colors or 16M Colors

**(J) List some 3D viewing devices**

1. Stereoscopic systems

2. Virtual reality systems

3. 3D glasses

4. Projector

**(K). Specular Reflection**

Specular reflection is a type of surface reflectance often described as a mirror-like reflection of light from the surface. In specular reflection, the incident light is reflected into a single outgoing direction. The name specular is derived from the Latin word speculum, meaning mirror.

**(L)Diffusion Reflection**

Specular reflection, also known as regular reflection, is the mirror-like reflection of waves, such as light, from a surface. In this process, each incident ray is reflected, with the reflected ray having the same angle to the surface normal as the incident ray.

**(M) Ambient Reflection**

Reflection of light or particles from surface in such a way that a ray incident on surface is scattered at many angles rather than just one.

**N) Clipping**

Clipping, in the context of [computer graphics](https://en.wikipedia.org/wiki/Computer_graphics), is a method to selectively enable or disable [rendering operations](https://en.wikipedia.org/wiki/Rendering_(computer_graphics)) within a defined [region of interest](https://en.wikipedia.org/wiki/Region_of_interest). Mathematically, clipping can be described using the terminology of [constructive geometry](https://en.wikipedia.org/wiki/Constructive_geometry). Good clipping strategy is important in the development of [video games](https://en.wikipedia.org/wiki/Video_games) in order to maximize the game's [frame rate](https://en.wikipedia.org/wiki/Frame_rate) and visual quality.

**Raster System Numericals**

1. **How much time is spent scanning each row of pixels during screen refresh on a raster system with a resolution of 1280 x 1024 and refresh rate of 30 frame per second?**

Ans. Here, resolution = 1280 X 1024

That means system contains 1024 scan lines and each scan line contains 1280 pixels

refresh rate = 30 frame/sec.

So, 1 frame takes = 1/30 sec.

Since resolution = 1280 X 1024

1 frame buffer consist of 1024 scan lines

It means then 1024 scan lines takes 1/30 sec

Therefore, 1 scan line takes ,

1/30 X 1/1024

Sec = 0.0000325 sec

1. **Find out the aspect ratio of the raster system using 8 x 10 inches screen and 100 pixel/inch.**

Ans. We know that,

Aspect ratio =Width/Height

= 8 x 100/10 x 100

Aspect ratio = 4 : 5

1. Suppose RGB raster system is to be designed using on 10 inch x 12 inch screen with a resolution of 400 pixels per inch in each direction. If we want to store 16 bits per pixel in the frame buffer, how much storage (in bytes) do we need for frame buffer?
2. **If a 280,000 pixel screen has 700 pixels in each horizontal row, how many pixels are in each vertical column?**

We know that resolution = width \* height and width is given so,

700 \* height = 280,000 pixels

Height = 280,000/700

Height = 400pixels.

Note:**Practice More**

**Line Drawing Algo**

**1: Explain why DDA algorithm is rejected for drawing line.**

DDA solved one problem of multiplying mx but 2 problems were still there in it

1. Y has to be rounded off.
2. Floating point addition.
3. **Provide Psudo code of bresenham’s line Drawing algo.**

Step 1: Input the line endpoints and store the left endpoint in (X0, Y0) Step 2: Load (X0, Y0) in to the frame buffer

Step 3: Calculate constants ∆x, ∆y, 2 ∆y, -2 ∆x, and obtain the decision parameters as P0 = 2 ∆y – ∆x

Step 4 : At each Xk along the line, starting at k = 0, perform the following test If Pk< 0, the next point to plot is (Xk+1, Yk) and Pk+1 = Pk+2 ∆y Otherwise, the next point to plot is (Xk+1, Yk+1) and Pk+1 = Pk+2 ∆y - 2 ∆x

Step 5: Repeat step 4 ∆x times

1. **Provie 3 poblems of line drawing equation**
2. **O**nly handles lines in the first quadrant that aren’t “steep”.
3. Uses floating point arithmetic!

* Slow, expensive, accumulates error.

1. No anti-aliasing, but this is outside of the scope of our problem.
2. **Why the Bresenham’s line drawing is the Best one.**

Because it is fast and there is no round off error in it.

**Circle Drawing Algo**

1. **Provide Bresenham’s circle drawing algorithm in detail**

Ans. Step 1:Input radius r and circle center(Xc, Yc)and obtain the first point on the circumference of a circle centered on the origin as (X0, Y0) = (0, r)

Step 2: Calculate the initial values of the decision parameter as

P0 = 5/4 – r

Step 3: At each position starting at k perform the following test:

If Pk< 0, the next point to plot is (Xk+1, Yk) and

Pk+1 = Pk+2 Xk+1 + 1

Otherwise the next point is (Xk+1, Yk+1) and

Pk+1 = Pk+2 Xk+1 + 1- 2 Yk-1

Step 4: Determine symmetry points in the other seven octants

Step 5: Move each pixel position(X, Y) onto the circular path centred on (Xc, Yc) and plot the coordinate values as

X = X + Xc

Y = Y + Yc

Step 6: Repeat steps 3 through until X>=Y

Pk + 1= Pk + 2 ∆Y

Other wise, the next point is (Xk+1, Yk+1) and

Pk + 1= Pk + 2 ∆Y - 2 ∆X

Step 7: Repeat steps 4 ∆X times

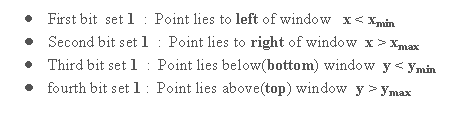
1. Bresenham’s algorithm can be extended to circles. Convince yourself of this statement by considering a circle centered at the origin. Which parts of the circle must be generated by an algorithm and which parts can be found by symmetry? Can you find a part of the circle such that if we know a point generated by a scan-conversion algorithm, we can reduce the number of candidates for the next pixel?
2. Why did we use symmetry in circle drawing and what happens if it is not used.

**Clipping:**

1: Use the Cohen Sutherland algorithm to clip line P1 (80, 20) and P2 (110, 10) against a window lower left hand corner (40, 10) and upper right hand corner (90, 40).

**2: Write ABLR code for Clipping Window**

For any endpoint ( x , y ) of a line, the code can be determined that identifies which region the endpoint lies. The code's bits are set according to the following conditions:



**3: Write All steps involved in Line clipping using Cohen Sutherland Algorithm**

Step 1 − Assign a region code for each endpoints.

Step 2 − If both endpoints have a region code 0000 then accept this line.

Step 3 − Else, perform the logical AND operation for both region codes.

Step 3.1 − If the result is not 0000, then reject the line.

Step 3.2 − Else you need clipping.

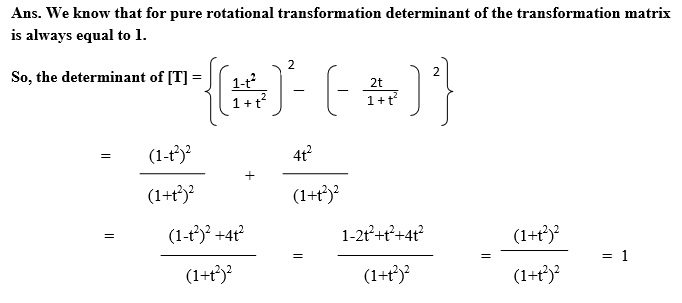
Note: Practice Clipping Questions More.

**Transformations**

**1.Show that the 2x2 matrix**

**represents pure rotation.**

Represents pure rotation.



**2. Write all the points which describe the rotation about arbitrary point other than the origin.**

TSRT

3. Rotate P= (8, 4, 3) by 30 degrees along Y-axis.  
4. Find a transformed point Q caused by rotating P (3, 5) about the origin through an angle of 60o.

**5. What are the steps involved in animation sequence?**

1. Storyboard layout
2. Object definition
3. Key frame specification
4. Generation of in-between frame

6. Provide a 3x3 matrix that will compute the new vertices of a planner box after a rotation of 45 degrees and a scaling of factor 0.7 about its center [4,5].   
7. Provide a 4x4 matrix that will compute the new vertices of a planner box after a rotation of 60 degrees and a scaling of factor 0.5 about its center [8, 4, 3].

**Polygon Filling Algorithm**

1. **Explain Polygon filling algorithm with 4 connectivity in detail**

Ans. In this technique 4-connected pixels are used. We are putting the pixels above, below, to the right, and to the left side of the current pixels and this process will continue until we find a boundary with different color.

1. **Explain Polygon filling algorithm with 8 connectivity in detail**

Ans. In this technique 8-connected pixels are used as shown in the figure. We are putting pixels above, below, right and left side of the current pixels as we were doing in 4-connected technique. In addition to this, we are also putting pixels in diagonals so that entire area of the current pixel is covered. This process will continue until we find a boundary with different color.

1. **Explain Scan line polygon filling algorithm in details with an example**
2. Ans. Calculate ymaxand ymin passing to the body of the polygon.
3. Than find the size of ymax.
4. Check the edges passing through the line.
5. If monotonical increases or decreases than it will consider 1 point.
6. If monotonical increases than decreases or monotonical decreases than increases than it will consider 2 points.
7. The pairs will begin and color from left to right.

**Curves**

1. **Write all parameters involved in making an elipse**

Ans. *An ellipse can be defined as the*[*locus*](https://www.mathopenref.com/locus.html)*of all points that satisfy the equations*

***x = a cos t   
y = b sin t***

*where:****x****,* ***y*** *are the coordinates of any point on the ellipse,****a, b*** *are the radius on the* ***x*** *and* ***y*** *axes respectively,* ***t****is the parameter, which ranges from 0 to 2π radians.*

Implicit:

+ = 1

This is only for the special case where the ellipse is centered at the

origin with the major and minor axes aligned with y= 0 and x= 0.

1. **Write all parameters involved in making parabola**
2. **Write down main properties of bazier curves**
3. Ans. The Bezier curve always passes through the first and last control points i.e. curve has same end points as the guiding polygon.
4. The curve generally follows the shape of the defining polygon.
5. The degree of the polynomial defining the curve segment is one less than the number of defining polygon point. Therefore, for 4 control points, the degree of the polynomial is 3.
6. The direction of the tangent vector at the endpoints is the same as that of the vector determined by first and last segments.
7. The curve lies entirely within the convex hull formed by 4 control points.
8. The convex hull property for a Bezier curve ensures that the polynomial smoothly follows the control points.
9. The curve does not oscillate about any straight line more than the defining polygon.
10. The curve is invariant under an affine transformation.
11. Given Bo = [1,1], B1 = [2,3]. B2 = [3,1] and B3 = [4,3] the vertices of a Bezier polygon. Determine 5 points on the Bezier curve for any five values of t.
12. Given Bo = [3,1], B1 = [5,3]. B2 = [3,6] and B3 = [9,5] the vertices of a Bezier polygon. Determine 10 points on the Bezier curve for any 10 values of t.

Note: Practice Bazier Curves More:

**Lighting and Shading**

1. **Explain shadow masking.(Refer PDF Material Provided)**

Ans. The **shadow mask** is one of the technologies used to manufacture cathode ray tube (CRT) televisions and computer displays that produce color images. All early color televisions and the majority of CRT computer monitors used shadow mask technology.

1. **Write down the general Equation of phong reflection model**

Ans.



1. **How the world look like in following situations?**

**without ambient light.  
with too much ambient light.**

1. A world without ambient light is one filled with sharp edges, of bright objects surrounded by sharp, dark, harsh shadows.
2. A world with too much ambient light looks washed out and dull.
3. **The Phong reflection model is an approximation of physical reality to produce good rendering under a variety of lighting conditions and material properties. Describe the four vectors, the model uses to calculate a color for an arbitrary point p. Illustrate with a figure.**

Phong reflection model calculate color for arbitrary point on surface

Basic inputs are material properties and l, n, v:

l = vector to light source

n = surface normal

v = vector to viewer

r = reflection of l at p

(determined by l and n)



**Animation**

1. **Write at least 5 basic principle of stunning animation video**
2. **Squash and stretch**
3. **Anticipation**
4. **Staging**
5. **Straight ahead & pose-to-pose**
6. **Follow-through & overlapping**
7. **Ease-in & ease-out**
8. **How staging should be used in making an animated video**
9. **Should we always consider real time drawing rules in making object or we can exaggerate little bit. Justify your answer**

**Yes!** We should exaggerate drawing rules in the making of object because things need to realistic And action look real. So, we conclude that Action and realism is exaggerate . we have to make the characters real and active. It need to involve Action in your character so it look like real one.

1. **What are the methods of motion specifications?**

Interactive motion specification

Approximated dynamical simulation

Distance weighted inter- polation

1. What rules of physics should be kept in mind to make an animated video

Best of luck for Terminal and for future also. :)