B2.53-R3: COMPUTER GRAPHICS

NOTE:

1.	There are **TWO PARTS** in this Module/Paper. **PART ONE** contains **FOUR** questions and **PART TWO** contains **FIVE** questions.
2.	**PART ONE** is to be answered in the **TEAR-OFF ANSWER SHEET** only, attached to the question paper, as per the instructions contained therein. **PART ONE** is **NOT** to be answered in the answer book.
3.	Maximum time allotted for **PART ONE** is **ONE HOUR**. Answer book for **PART TWO** will be supplied at the table when the answer sheet for **PART ONE** is returned. However, candidates, who complete **PART ONE** earlier than one hour, can collect the answer book for **PART TWO** immediately after handing over the answer sheet for **PART ONE**.

TOTAL TIME: 3 HOURS   **TOTAL MARKS: 100**
(PART ONE – 40; PART TWO – 60)

PART ONE
(Answer all the questions)

1. **Each question below gives a multiple choice of answers. Choose the most appropriate one and enter in the "tear-off" answer sheet attached to the question paper, following instructions therein.** **(1 x 10)**

1.1   In Plasma Panels picture definition is stored in
A)   Memory
B)   Gas Discharge
C)   Refresh Buffer
D)   None of the above

1.2   Reflection about the line y = -x transformation is equal to:
A)   The sequence of transformations:
    i)   clockwise rotation by 45 degree
    ii)   reflection about the X - xis
    iii)   counter-clockwise rotation by 45 degree
B)   The matrix transformation

$$\begin{matrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{matrix}$$

in homogeneous co-ordinate system
C)   Reflection about the X-axis followed by a counter clockwise rotation of 90 degree
D)   None of the above

1.3   Scan line seed fill algorithm is a
A)   Flood fill algorithm
B)   Boundary defined algorithm
C)   Both A) and B) above
D)   None of the above

1.4   Bresenham's circle drawing algorithm involves
A)   Solving equation of the circle
B)   Calling a lookup table to get points corresponding to a particular value of radius
C)   Computation of location of individual pixels on each part of the circle
D)   Only integer calculation

1.5   In an interlacing technique each frame is displayed as:
A)   One pass
B)   Two passes
C)   Three passes
D)   Four passes

1.6   In homogeneous coordinate system the 3D point [6, 12, 0] can be represented in a number of ways. Pick out the INCORRECT choice.
A)   [6 12 0 1]
B)   [12 24 0 2]
C)   [3 6 0 1/2]
D)   [3 6 0 0]

1.7   Anti-clock wise rotation of 90° about z-axis would transfer a point:
A)   On X-axis to negative
B)   On Y-axis to X-axis
C)   On X-axis to Y-axis
D)   On X-axis to negative Y-axis

1.8   For carrying out Sutherland-Cohen clipping the end-point codes of 4 lines are given below. Find out which one will represent totally invisible line from clipping window.
A)   0000, 0000
B)   0100, 1000
C)   0001, 1000
D)   0110, 1010

1.9   Which header file should be included before either "gl.h" or "glu.h"?
A)   iostream.h
B)   windows.h
C)   Both A) and B) above
D)   None of the above

1.10   Adequate storage space for production environments can be provided by
A)   Large capacity hard disk
B)   Optical media
C)   Server mounted disk on a network
D)   All of the above

2. **Each statement below is either TRUE or FALSE. Choose the most appropriate one and ENTER in the "tear-off" sheet attached to the question paper, following instructions therein.** (1 x 10)

2.1 "Machine perception of Virtual Information" is one of the main applications of Image processing.
2.2 In perspective projection all rays parallel to line of sight appear to meet at a point.
2.3 Shadow mask methods are used for monochrome TV.
2.4 Co-ordinates of a point lying at infinity cannot be used with perspective matrix.
2.5 Depth buffer method to detect visible surfaces needs knowledge of plane equation for each surface under consideration.
2.6 Any shear (along X Axis/along Y Axis) can be represented by a translation to origin, a rotation, a scaling, a reverse of rotation and a reverse of translation.
2.7 Circular helix is an example of a parametric space curve.
2.8 MIDI can be used to playback the spoken dialogue.
2.9 A clipping algorithm can be made more efficient if totally visible and totally invisible lines could be identified and separated from the remaining lines.
2.10 OpenGL restricts the number of line segments making up the boundary of a convex polygon.

3. **Match words and phrases in column X with the closest related meaning/ word(s)/phrase(s) in column Y. Enter your selection in the "tear-off" answer sheet attached to the question paper, following instructions therein.** (1 x 10)

	X		Y
3.1	The device to interact with animated artificial objects	**A.**	Translation
3.2	Midpoint subdivision clipping algorithm requires	**B.**	Perspective view
3.3	Algorithm in which the viewing specification changes but the scene remains static.	**C.**	Tweening
3.4	Dragging relates	**D.**	Resolution
3.5	OpenGL command specifies co-ordinate system	**E.**	Morphing
3.6	Vanishing point is generated in	**F.**	Data glove
3.7	Adding black and white color pigments produces	**G.**	Integer calculation
3.8	Accuracy of sound or image is measure by	**H.**	Scaling
3.9	Technique of building progressive images and running it in a sequence	**I.**	Binary Space Partitioning tree
3.10	Effect in which one image changes into another	**J.**	Tint
		K.	Animation
		L.	Tone
		M.	glOrtho()

4. **Each statement below has a blank space to fit one of the word(s) or phrase(s) in the list below. Enter your choice in the "tear-off" answer sheet attached to the question paper, following instructions therein.** **(1 x 10)**

A.	Circle Generation	B.	single	C.	Maximum
D.	Center	E.	Windowing	F.	Horizontal retrace
G.	Shearing	H.	Minimum	I.	Two
J.	Three	K.	Clipping	L.	Vertical retrace
M.	Double	N.	Window manager	O.	Concave hull
P.	Middle	Q.	Viewport	R.	Convex hull

4.1   A graphic interface component that allows a user to display multiple window areas is _____.

4.2   The return to the left of the screen after refreshing each scan line is called _____.

4.3   In _____ algorithm only one octant need to be generated and other parts can be obtained by successive reflections.

4.4   The convex polygon boundary that encloses a set of control points is called the _____.

4.5   To modify the object shapes _____ transformation is used.

4.6   Projector is lines from an arbitrary point called _____ of projection, through each point in object.

4.7   Each element of the depth buffer corresponds to a pixel in the frame buffer and initially holds the _____ depth in the scene.

4.8   A cube is rotating on the screen, at any point in time; the maximum number of visible faces would be _____.

4.9   An area on a display device to which a window is mapped is called a(n) _____.

4.10   A(n) _____ buffered window means that all drawing commands are directly performed on the displayed window.

PART TWO
(Answer any **FOUR** questions)

5.

a) Obtain a transformation matrix for translating a point by $t_x=-1$, $t_y=2$. Calculate the matrix of the inverse operation.

b) Find the reflected view of a triangle with vertices (30, 40), (50, 50) and (40, 70) about the mirror which is vertically placed such that it passes through (20, 0).

c) Given a rectangle on the screen, describe the steps to double the size of the rectangle taking care that the centre of the rectangle does not change.

(5+5+5)

6.

a) What are plasma panels and how do they work?

b) How can the light pen differentiate between two points on the screen when both have the same color/intensity?

c) Given a clipping window P(0, 0), Q(30, 0) R(30, 20), S(0, 20), use Sutherland-Cohen algorithm to determine the visible portion of the line A(10, 30) and B(40, 0).

(5+5+5)

7.

a) Define Geometric Continuity and Parametric Continuity.

b) Describe Painter's Algorithm.

c) How are colours generated in color monitor? Describe briefly.

(4+7+4)

8.

a) Describe the reasons for the popularity of OpenGL.

b) Write the essential functions which are used while creating a user-defined window, in proper sequence.

(6+9)

9.

a) Derive a transformation matrix for finding perspective projection of point (x, y, z) onto the place z = d.

b) What is the difference between entropy encoding and source encoding?

c) Compare between 2D and 3D animation.

(8+4+3)