

A10.3-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 If a 1024 x 768 image is to be resized to one that is 640 pixels wide with the same aspect ratio, what would be the height of resized image in pixels.
 - A) 256
 - B) 480
 - C) 512
 - D) 856
 - 1.2 Which format is used to store digital audio in multimedia application?
 - A) GIF
 - B) WAV
 - C) JPEG
 - D) BMP
 - 1.3 Which method is also known as Painter’s algorithm?
 - A) Scan Line
 - B) BSP-Tree
 - C) Depth-Sorting
 - D) Area-Subdivision
 - 1.4 For which type of display the beam-penetration method has not been used?
 - A) Calligraphic Display
 - B) Random-scan Display
 - C) Raster-scan Display
 - D) Stroke-Writing Display
 - 1.5 A phosphor with low persistence is useful for
 - A) Animation
 - B) Image Processing
 - C) CAD method
 - D) Presentation

- 1.6 An orthographic projection is a
- A) Perspective projection
 - B) Parallel projection
 - C) Projection on a curved surface
 - D) None of the above
- 1.7 Which of the following color model is useful for describing color output to hardcopy device such as plotter?
- A) RGB color model
 - B) YIQ color model
 - C) CMY color model
 - D) HSV color model
- 1.8 Which Line Clipping algorithm performs fewer comparison and division operations to clip a line?
- A) Nicholl-Lee-Nicholl line clipping algorithm
 - B) Cohen-Sutherland line clipping algorithm
 - C) Liang-Barsky line clipping algorithm
 - D) Cyrus-Beck line clipping algorithm
- 1.9 The graphics tablet belongs to which type of input device?
- A) Stroke
 - B) String
 - C) Valuator
 - D) Pick
- 1.10 "If the position of any one control point is altered the entire curve is affected." This statement is true for
- A) Natural Cubic Splines
 - B) Kocknek-Bartels Splines
 - C) Beta-Splines
 - D) Rational Splines

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 Convex polygons are correctly clipped by the Weiler-Atherton polygon clipping algorithm, but concave polygon may be clipped with extraneous lines.
- 2.2 The MIDI files are much more compact than digital audio files.
- 2.3 For Cubic Bezier curves, only four blending function can be obtained.
- 2.4 Space-partitioning representation describes a three-dimensional object as a set of surfaces.
- 2.5 The maximum number of points that can be displayed without overlap on a CRT is referred as the aspect ratio.
- 2.6 The multiplication of transformation matrices for two successive scaling operations is commutative.
- 2.7 Objects with curved boundaries are processed against rectangular clipping windows by calculating intersections using the line equation.
- 2.8 Constants shading can produce good result for dull polyhedrons lit by light sources that are relatively far away.
- 2.9 A commonly used image-space approach to detecting visible surface is the depth-buffer method which compares surface depths at each pixel position on the projection plane.
- 2.10 Back face removal method is applicable for curved surface.

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	Object-motion characteristics to be specified as part of the object definition in	A.	Scaling
3.2	A common device for drawing, painting or interactively selecting coordinates position on object is	B.	An image file
3.3	A transformation that distorts the shape of an object such that the transformed shape appears as if the object were composed of internal layer is	C.	Refresh display file
3.4	To apply image-processing methods, we first digitize a picture into	D.	Line clipping
3.5	In random display, picture definition is stored as a set of line drawing commands in an area of memory referred to as the	E.	Data glow
3.6	The midpoint subdivision algorithm is used for	F.	Parameterised System
3.7	Dragging in computer graphics can be achieved through	G.	Digitizers
3.8	The creation and manipulation of a system representation is termed as	H.	Window transformation
3.9	The mapping of a part of a world-coordinate scene to device coordinate is referred as	I.	Translation
3.10	Super Sampling is also known as	J.	Key-Frame System
		K.	Shearing
		L.	Viewing transformation
		M.	Pixel phasing
		N.	Post filtering
		O.	Modelling

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.	B-splines	B.	Aliasing	C.	Wire frame
D.	AVI	E.	Bezier curve	F.	Seed
G.	Color	H.	CRT	I.	WAV
J.	Viewing-coordinate	K.	Perspective Projection	L.	Tweeking
M.	Parallel Projection	N.	Emissive display	O.	Presentation
P.	Homogeneous coordinate	Q.	Animation	R.	Polar Coordinates

- 4.1 To obtain _____ of a three-dimensional object, we transform points along projection lines that meet at the projection reference point.
- 4.2 _____ files are used to store audio and video data.
- 4.3 The _____ is a technique for building progressive images and running it in a sequence to give the effect of motion.
- 4.4 To express two-dimensional transformation as 3x3 matrix, we represent each Cartesian coordinate position with the _____.
- 4.5 To obtain a particular orientation for the window, we can set up a two-dimensional _____ system, in the world coordinate plane and define a window in it.
- 4.6 Uniform _____ have periodic blending function.
- 4.7 The _____ are devices that convert electrical energy into light.
- 4.8 In a rasterized line the phenomenon known as _____ is responsible for jagged edges or stair case effect.
- 4.9 The flood fill algorithm begins with a _____ pixel in the interior of the regions and floods the region with the new color.
- 4.10 Three-dimensional solid objects can be displayed in two ways namely as _____ models and solid models.

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

- 5.**
- a) What are the advantages and disadvantages of DDA line drawing algorithm?
 - b) Write down the properties of Bezier curve giving their usefulness.
 - c) Write down the steps of midpoint circle generation algorithm.
- (2+5+8)**
- 6.**
- a) When a 3D object is to be rotated about any axis that is parallel to x-axis, we need to perform some additional transformation. Derive the 3D rotation transformation matrix for rotation of an object about x-axis.
 - b) What is an OpenGL? Explain architecture of OpenGL. What are the features of graphics library?
- (10+5)**
- 7.**
- a) One way to fill an area is to determine the overlap intervals for scan lines that cross the area. What are the steps involved for filling a polygon using the scan line fill algorithm?
 - b) Any procedure that identifies those portions of a picture which are either inside or outside of a special region of a space is referred as a clipping algorithm. Describe Cohen-Sutherland Line Clipping method.
- (10+5)**
- 8.**
- a) Perform a 45° rotation of triangle A(0, 0), B(1, 1), C(5, 2)
 - i) about the origin and
 - ii) about point P(-1, -1)
 - b) What are the various application areas of computer graphics?
 - c) A general purpose language is often used to program the animation functions, but several specialized animation languages have been developed. Give the names of these languages and explain in brief.
- (8+4+3)**
- 9.** Answer any **three** in brief:
- a) Name the available method for inside-outside test of point for polygon. Explain those methods.
 - b) Write steps of Z buffer algorithm.
 - c) Explain the different methods for producing color display with a CRT.
 - d) Explain Direct View Storage Tube input device.
- (3x5)**