

## 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 the resolution of VDU is 1024x1024 and the size of VDU is 17” x 14” then the aspect ratio is
    - A) 17/14
    - B) 14/17
    - C) 1
    - D) None of the above
  - 1.2 Which of the following format is used to store digital images in multimedia applications
    - A) PICT
    - B) MIDI
    - C) WAVE
    - D) None of the above
  - 1.3 Which of the following are generated by successively dividing a two dimensional regions into quadrants
    - A) Octree
    - B) Binary space partitioning tree
    - C) Quadtree
    - D) None of the above
  - 1.4 Which of the following are commonly used in small systems such as calculators and laptops
    - A) Light emitting diode
    - B) Plasma panel
    - C) Liquid Crystal display
    - D) None of the above
  - 1.5 The normal to the any surface at any point is given by
    - A) cross product of parametric derivatives
    - B) dot product of parametric derivatives
    - C) scalar triple product of vectors
    - D) none of the above

- 1.6 What is the location of the second pixel to be plotted with centre as the origin and radius 12 units
- A) (0, 12)
  - B) (12, 0)
  - C) (1, 12)
  - D) (12, 1)
- 1.7 The KNOT VECTOR (0,0,0,0,1,2,4,5,6,6,6,6) represents \_\_\_\_\_ B-spline
- A) closed
  - B) open
  - C) uniform
  - D) none of the above
- 1.8 Vanishing points are used for
- A) rendering the objects
  - B) projecting objects onto planes
  - C) academic interest only
  - D) Depth cue
- 1.9 The standard colour diagram for studying colours is
- A) Colour palette
  - B) Chromaticity diagram
  - C) HSV diagram
  - D) None of the above
- 1.10 If  $V$  is a vector in the viewing direction of the eye and  $N$  is normal vector to a polygon surface then the polygon is the backface if  $V \cdot N$  is
- A) less than 0
  - B) more than 0
  - C) less than -1
  - D) none 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 Homogenous co-ordinates (x, y, z) represents the point (x, y) in 2D.
- 2.2 Liquid Crystal and light emitting diode are most suitable for passive technologies.
- 2.3  $B(t) = tP_1 + (1-t)P_2$   $0 \leq t \leq 1$  is a Bezier curve with two control points.
- 2.4 Cohen-Sutherland algorithm for line clipping cannot be used both in 2D and 3D.
- 2.5 Product of two affine transformations is affine.
- 2.6 The parallel projection does not require direction of projection.
- 2.7 Keyframes are snapshots of the scene which is to be animated.
- 2.8 Inverse of translation  $t_x$ , along X-axis is  $\frac{1}{t_x}$ .
- 2.9 OpenGL is hardware independent interface.
- 2.10 The default line width in OpenGL is 1.0.

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	Data structure used for seed fill algorithm	A.	2
3.2	Video compression algorithm	B.	18
3.3	The number of ways to specify the position of point on screen	C.	32
3.4	Height of image is 24”, aspect ratio is $\frac{3}{4}$ , then the width of the image is	D.	Inversible line
3.5	The time taken by light emitted by the phosphor to decay to its 1/10 of original intensity	E.	Random scan
3.6	The electron beam is directed only to the parts of screen where the picture is drawn	F.	Persistence
3.7	The advantage of raster scan device	G.	Cavilier projection
3.8	The line with end points having codes (1,0,0,0) and (0,0,0,1) w.r.t. a rectangular window in 2D	H.	Stack
3.9	Oblique projection with projection angle $\alpha$ , with $\tan \alpha=1$	I.	MPEG
3.10	$(2\hat{i} + \hat{j} + 4\hat{k}).(13\hat{i} + 2\hat{j} + \hat{k})$	J.	Solid area representation
		K.	Aspect ratio
		L.	Raster scan
		M.	JPEG
		N.	Queue
		O.	10
		P.	Visible line

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.	Digitization of an image	B.	Hidden surface	C.	putFlush( )
D.	Number of lines	E.	Removal	F.	Non-antialiased
G.	Watkins algorithm	H.	60 to 80	I.	30 to 40
J.	Symmetric	K.	Nichol lee Nichol algo	L.	Hidden line
M.	getFlush( )	N.	Asymmetric	O.	Perpendicular
P.	Projective	Q.	Cartesion	R.	Parallel
S.	$a \times b$	T.	$a . b$	U.	Antialiased

- 4.1 Floating horizon technique is used for \_\_\_\_\_ removal.
- 4.2 The refresh rate of a raster scan device is \_\_\_\_\_.
- 4.3 The scan conversion is the process of \_\_\_\_\_.
- 4.4 Refresh rate of random scan system depends on \_\_\_\_\_ frames per second to be displayed.
- 4.5 An algorithm which is faster then ray-tracing algorithm is \_\_\_\_\_.
- 4.6 Bezier-Curve is \_\_\_\_\_.
- 4.7 \_\_\_\_\_ forces previously issued OpenGL commands to begin execution.
- 4.8 OpenGL works in homogenous co-ordinates of 3D \_\_\_\_\_ geometry.
- 4.9 With \_\_\_\_\_ wide lines, the line with width is not measured perpendicular to the line.
- 4.10 If  $a = a_1\hat{i} + a_2\hat{j} + a_3\hat{k}$   
 $\hat{b} = b_1\hat{i} + b_2\hat{j} + b_3\hat{k}$   
 Then  $(a_2b_3 - b_2a_3, a_1b_3 - a_3b_1, a_1b_2 - a_2b_1)$  is the value for \_\_\_\_\_.

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

- 5.**
- a) How is computer graphics useful in education and training? Explain.
  - b) Describe the construction and working of liquid crystal display.
  - c) What are the new co-ordinates of a figure with vertices (3,0,0) (0,0,3) (3,3,3) when it is sheared along X-Axis through an angle of  $45^\circ$ .
- (4+4+7)**
- 6.**
- a) Describe rubber band method for drawing a line.
  - b) Why parametric cubic polynomial equations are used for drawing curves?
  - c) Generate an ellipse using transformation on a unit circle.
- (5+5+5)**
- 7.**
- a) Describe scan line seed fill algorithm for polygon filling.
  - b) Draw a Bezier-Curve using the control points  $P_0, P_1, P_2$  and  $P_3$  taken in the order.  

$P_0$	$P_2$
$P_3$	$P_1$
  - c) Describe the condition for first order continuity for joining two sections of the Bezier-Curve in terms of the control points of two curve sections.
- (5+5+5)**
- 8.**
- a) Find the projection of point (5,2,8) onto the plane  $Z = 3$  with Centre Of Plane at (0,0,5).
  - b) With respect to floating horizon algorithm define upper horizon and lower horizon.
- (8+7)**
- 9.**
- a) What do you mean by multimedia? Explain the hardware and software required for multimedia.
  - b) What are various specialized animation languages? Describe each briefly.
- (8+7)**