

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER- VI (OLD) EXAMINATION- WINTER 2017

Subject Code: 160703

Date: 03-11-2017

Subject Name: Computer Graphics

Time: 02:30 pm to 05:00 pm

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
Q.1	a Short Questions	07
	1 Find the refresh rate of a 640 X 480 frame buffer if it can access 8 pixels in a group simultaneously in an access time of 200ns	
	2 Consider the raster system with resolution of 1024X800 supporting 16 millions of colors. What is the size of frame buffer (in bytes) required?	
	3 What should the width and height of color look up table if at a time 256 colors out of 16 millions of colors are supported?	
	4 Define persistence	
	5 What is the four bit code of endpoints of line P(5,100) and Q(100,5) if clipping window is A(10,10) and B(100,100).What is the decision of Cohen-Sutherland clipping algorithm?	
	6 Homogenous coordinate representation of point is (4, 6, 2) What is Cartesian coordinate representation of same point?	
	7 What is the transformation matrix that reflect given object about y=0 axis?	
	b Briefly explain different methods to generate thick lines. Discuss merits and demerits of each method	07
Q.2	(a) Derive all formulas to scan convert a line using Bresenham's algorithm	03
	(b) Apply Bresenham's line drawing algorithm and find all the pixels of the line from (0,0) to (6,7).	04
	(c) Define aliasing. Why does aliasing occur in computer graphics? Briefly explain anti-aliasing techniques	07
	OR	
	(c) With example explain edge-table and active edge-table data structures of scan line polygon filling algorithm. Which criteria are used to add edge from edge-table to active edge-table? Which criteria are used to remove edge from active edge-table?	07

- Q.3 (a) Derive the transformation matrix that scale given object about given point 03
- (b) Consider the square A(1,0), B(0,0), C(0,1) and D(1,1). Rotate the square ABCD by 30 clockwise about A(1,0) 04
- (c) Briefly explain three cases of cohen-sutherland line clipping algorithm. Consider a clipping window A (3, 4), B (10, 4), C (10, 9) and D (3, 9). Using the Cohen-Sutherland line clipping algorithm, clip the line with end points X (2, 11) to Y (9, 2). 07

OR

- Q.3 (a) Prove that uniform scaling ($s_x=s_y$) and a rotation form a commutative pair of operations but that in general scaling and rotation are not commutative operations 03
- (b) What are the advantages of NLN clipping algorithm? Briefly explain NLN line clipping algorithm 04
- (c) A line from P1(-1, 1) to P2(9, 3) is clipped to the rectangular window, whose coordinates are (0, 0), (8, 0), (8, 4) and (0, 4). Find the visible portion of the line using Cyrus Back algorithm. 07

- Q.4 (a) Derive window to view port transformation 03
- (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). 04
- (c) Represent unit 3D cube with explicit, pointer to vertex list and pointer to edge list method. Also mention advantages and disadvantages of each method 07

OR

- Q.4 (a) Derive transformation that shear given object in x direction relative to $y=y_{ref}$ axis 03
- (b) Define and compared Geometric Continuity and Parametric Continuity for curve 04
- (c) Briefly explain following projections and mention their specific applications 07
1. Perspective projection
 2. Oblique parallel projection
 3. Orthographic parallel projection

- Q.5 (a) Briefly explain construction of Bezier curve 03
- (b) Briefly explain Boundary fill algorithm with its limitations 04
- (c) Briefly explain following reflections 07
1. Diffuse reflection
 2. Specular reflection

OR

- Q.5 (a) Briefly explain Delta-Delta color CRT display 03
- (b) Describe the hardware devices through which graphical data can be presented to a computer. 04
- (c) Mention advantages and disadvantages of Z-buffer visible surface algorithm. Briefly explain Z-buffer visible surface determination algorithm 07
