Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- VIth SEMESTER–EXAMINATION – MAY- 2012

Subject code: 160703 **Date: 15/05/2012**

Subject Name: Computer Graphics

Time: 10:30 am – 01:00 pm **Total Marks: 70**

Instructions:

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

Q.1	**(a)**	Briefly explain the following display technologies (1) Raster refresh systems (2) Vector refresh systems (3) LCDs	**07**
	(b)	1) Consider a raster system with resolution of 1280 by 1024. What size of frame buffer is needed for given system to store 24bits per pixel? How many colors are possible in given system? What is the access time per pixel if refreshing rate is 60 frames per second? 2) Briefly explain the advantages of Look table used in Graphics display system.	**04** **03**
Q.2	**(a)**	Derive all necessary formulas for Bresenham line drawing algorithm. Bresenham line drawing algorithm is used to draw a line from (0, 0) to (6, 4). Determine all the pixels which will be on as the line is drawn.	**07**
	(b)	Briefly explain the attributes associated with line and characters. Briefly explain the different methods for the generation of thick lines	**07**
		OR	
	(b)	Derive all necessary formulas for Midpoint circle drawing algorithm. Write pseudo code for Midpoint circle drawing algorithm.	**07**
Q.3	**(a)**	What is aliasing? Briefly explain anti-aliasing techniques	**07**
	(b)	1. Find out the composite transformation matrix to rotate a given 2D object by an amount θ about given point P1(x1, y1). 2. What is homogeneous coordinate? Why is it required?	**04** **03**
		OR	
Q.3	**(a)**	Develop and implement a flood-fill algorithm to fill the interior of any specified area. What are the differences between flood-fill and boundary fill algorithm?	**07**
	(b)	Find out composite transformation matrix to reflect a triangle with vertices A (-2, 1), B (-1, 2) and C (-2, 2) about line y=x+2. Also find the coordinates of reflected object.	**07**
Q.4	**(a)**	Clip the line PQ having coordinates A(4,1) and B(6,4) against the clip window having vertices A(3,2) , B(7,2) , C(7,6) and D(3,6) using Cohen Sutherland line clipping algorithm. Mention the limitations of algorithm. How it can be overcome?	**07**
	(b)	Compare parallel and perspective projection. Derive perspective transformation matrix with centre of projection (0, 0, -d) and xy as a plane of projection.	**07**
		OR	
Q.4	**(a)**	Develop and implement Cyrus-beck line clipping algorithm.	**07**
	(b)	Find out the 3D transformation matrix to rotate a given 3D object by	**07**

an amount 60 about line passing from point(1,1,1) and the direction vector V=2i+2j+2k.

Q.5 **(a)** What is a polygon mesh? Discuss various ways to represent a polygon mesh with their merits and demerits. **07**

(b) 1. Briefly explain parametric cubic curve and its applications. **03**

2. Briefly explain Z-buffer visible surface determination algorithm. **04**

OR

Q.5 **(a)** Briefly explain specular and diffuse reflection. What is the importance of illumination and shading model in creating realistic image? **07**

(b) 1. Briefly explain about RGB, CMY and YIQ color models. **04**

2. Briefly explain 3D viewing process. **03**

****