GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–V (NEW) EXAMINATION – WINTER 2022

Subject Code:3151607   **Date:06-01-2023**
Subject Name:Computer Graphics and Visualization
Time:10:30 AM TO 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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	List the applications of computer graphics and discuss any two in detail.	**03**
	(b)	Discuss following OpenGL functions: gluLookAt(), gluPerspective()	**04**
	(c)	Explain the concept of pinhole camera of imaging system. Also derive the expression for angle of view	**07**
Q.2	**(a)**	Discuss Index color model with relevant OpenGL Functions	**03**
	(b)	List and explain various OpenGL primitives with functions.	**04**
	(c)	Explain major groups of open GL graphics functions.	**07**
		OR	
	(c)	Derive transformation matrices for rotation about origin and rotation about reference point (x_r, y_r)	**07**
Q.3	**(a)**	Compare and contrast: Parallel projection vs. Perspective projection	**03**
	(b)	Summarize the classification of various image space and object space algorithm. Discuss z buffer algorithm.	**04**
	(c)	Design the transformation matrix for perspective projection and give openGL 3D viewing functions	**07**
		OR	
Q.3	**(a)**	List out characteristics of good interactive program	**03**
	(b)	Discuss back face detection method with example	**04**
	(c)	Explain the OpenGL 3-dimensional viewing functions	**07**
Q.4	**(a)**	Discuss double buffering in OpenGL	**03**
	(b)	Derive transformation matrix for window to viewport mapping.	**04**
	(c)	Prove that "Two dimensional rotation and scaling are cumulative, if $S_x = S_y$ or $\theta = n\pi$".	**07**
		OR	
Q.4	**(a)**	Explain boundary fill algorithm.	**03**
	(b)	Draw a line from (0, 0) to (6, 4) using Bresenham's algorithm. Determine all the pixels which will be on as the line is drawn.	**04**
	(c)	Briefly explain the different types of light sources supported by OpenGL	**07**
Q.5	**(a)**	Discuss in brief: 3D polygon clipping.	**03**
	(b)	How to achieve texture mapping using OpenGL?	**04**
	(c)	Sketch the working of ray tracing algorithm with suitable diagram.	**07**

Q.5 **(a)** How B-spline differs from Bezier curve? **03**
(b) Discuss the properties of Bezier curve **04**
(c) Describe the marching squares algorithm **07**

****