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

Subject Code:3150712   **Date:06-01-2023**

Subject Name:Computer Graphics

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)**	Write the differences between Random Scan display and Raster Scan display.	**03**
	(b)	Discuss various ways to represent a polygon mesh in brief.	**04**
	(c)	Draw and explain working of Cathod Ray Tube with diagram.	**07**
Q.2	**(a)**	Write limitations of DDA line drawing method.	**03**
	(b)	Write a note on Even-Odd rule.	**04**
	(c)	Derive all necessary formulas for Midpoint circle drawing algorithm. Write pseudo code for Midpoint circle drawing algorithm.	**07**

OR

			MARKS
	(c)	Briefly explain scan line polygon filling algorithm. Explain the fields of edge table and criteria for adding and removing edge to active edge table.	**07**
Q.3	**(a)**	Write a note on 2D shearing.	**03**
	(b)	Obtain the matrix transformations for Reflection about the line $y = x$ in 2 – dimensions.	**04**
	(c)	Consider the clipping window with Lower Left coordinate (1,2) and Upper Right coordinate (8,4). Clip a line P(-6,-1) and Q(-1, 4) using Cohen Sutherland line clipping algorithm.	**07**

OR

Q.3	**(a)**	Explain limitations of Sutherland – Hodgeman polygon clipping algorithm.	**03**
	(b)	Retrieve equations for the scaling factors to match the window to viewport in 2D viewing system.	**04**
	(c)	Prove that the multiplication of 2D transformation matrices for each of the following sequence of operations is commutative: 1) Two successive rotations 2) Two successive translations	**07**
Q.4	**(a)**	Write a short note on 3D translation.	**03**
	(b)	Compare parallel and perspective projection.	**04**
	(c)	List and explain the properties of B-spline curves.	**07**

OR

Q.4	**(a)**	Write a short note on 3D rotation.	**03**
	(b)	Compare interpolation spline and approximate spline.	**04**
	(c)	List and explain the properties of Bazier curves.	**07**
Q.5	**(a)**	Explain ambient light in brief.	**03**

(b) Write a short note on YIQ color model. **04**

(c) Prove that the transformation matrix for the 3D rotation about an arbitrary axis can be expressed as the composition of following seven individual transformations : **07**

$R(\theta) = T\text{-}1.Rx\text{-}1(\alpha).Ry\text{-}1(\beta).Rz(\theta).Ry(\beta).Rx(\alpha).T$

OR

Q.5 **(a)** Explain the property of light using electromagnetic spectrum. **03**

(b) Write a short note on RGB color model. **04**

(c) Find out the 3D transformation matrix to rotate a given 3D object by an amount 60 about line passing from point(1,1,1) and the direction vector V=2i+2j+2k. **07**

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