

# GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER-V (NEW) EXAMINATION – WINTER 2020

**Subject Code: 2151603**

**Date: 03/02/2021**

**Subject Name: Computer Graphics**

**Time: 10:30 AM TO 12:30 PM**

**Total Marks: 56**

**Instructions:**

1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
<b>Q.1</b>	(a) What is Computer Graphics? List various applications of Computer Graphics.	<b>03</b>
	(b) How much time is spent scanning across each row of pixels during screen refresh on a raster system with resolution of 1280 X 1024 and a refresh rate of 60 frames per second?	<b>04</b>
	(c) Write the differences between random scan display and raster scan display.	<b>07</b>
<b>Q.2</b>	(a) Explain Odd-Even rule.	<b>03</b>
	(b) What are the differences between flood-fill and boundary fill algorithms?	<b>04</b>
	(c) Write circle generation algorithm and explain it with example.	<b>07</b>
<b>Q.3</b>	(a) Explain Translation transformation.	<b>03</b>
	(b) Apply the shearing transformation to square with A(0,0), B(1,0), C(1,1) and D(0,1) as given below:  1) Shear parameter value of 0.5 relative to line Yref = -1 2) Shear parameter value of 0.5 relative to line Xref = -1	<b>04</b>
	(c) Derive 2D reflection matrix about arbitrary line.	<b>07</b>
<b>Q.4</b>	(a) Explain Scaling transformation.	<b>03</b>
	(b) Derive 2D transformation matrix for rotation about arbitrary point.	<b>04</b>
	(c) Obtain the mirror reflection of the triangle ABC about the line passing through the points (4, 6) and (10,15) where A,B,C have coordinate values (0,10),(0,50) and (-20,30) respectively.	<b>07</b>
<b>Q.5</b>	(a) Write difference(s) between parallel projection and perspective projection.	<b>03</b>
	(b) Let $r(t)=(t,t^2)$ for $0 \leq t \leq 1$ & Let $n(t)=(2t+1,t^3+4t+1)$ for $0 \leq t \leq 1$ . Notice that $r(1)=(1,1)=n(0)$ for r and n join with $C^0$ continuity:- 1] Do n(t) and r(t) meet with $C^1$ continuity at the join point? 2] Do n(t) and r(t) meet with $G^1$ continuity at the join	<b>04</b>

- (c) Derive 3D transformation matrix for rotation about line which is parallel to any one of the co-ordinate axis. **07**
- Q.6** (a) Define following terms: **03**  
1) Parametric Continuity  
2) Geometric Continuity
- (b) What is projection? List out types of projection with diagram. **04**
- (c) Explain the Cohen Sutherland line clipping algorithm. **07**
- Q.7** (a) Discuss two approaches used to determine hidden surfaces. **03**  
(b) Briefly explain Back Face Detection algorithm. **04**  
(c) What is window and view-port? Retrieve equations for the scaling factors to map the window to view-port in 2D viewing system. **07**
- Q.8** (a) What is depth buffer method? **03**  
(b) List out properties of Bezier Curve. **04**  
(c) Explain RGB Color model in detail. **07**

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