

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**DIPLOMA IN INFORMATION TECHNOLOGY**  
**Semester: 4**

**Subject Name:     COMPUTER GRAPHICS**

<b>Sr.No</b>	<b>Course content</b>
1.	<b>Introduction to Computer Graphics</b> 1.1 History of Computer Graphics 1.2 Graphics standard 1.3 Application of Computer Graphics
2.	<b>Input – Output Devices</b> 2.1 Video Display Devices 2.2 Raster Scanning 2.3 Raster Scanning Display System 2.5 Random Scan Display 2.6 CRT 2.7 Color CRT 2.8 Flat panel Displays 2.9 VGA 2.10 Hardcopy Devices 2.10.1 Halftoning 2.10.2 Printers 2.11 Input Devices
3.	<b>Output Primitives</b> 3.1 Line drawing Algorithm 3.1.1 Simple Line Drawing Algorithm 3.1.2 DDA algorithm 3.1.2 Bresenham's Line Algorithm 3.1.3 Parallel Line Algorithm 3.2 Circle Drawing Algorithm 3.2.1 Mid-point circle algorithm 3.3 Other Curves 3.3.1 Conic Sections 3.3.2 Polynomials and Spline Curves 3.4 Filled Area Primitives 3.4.1 Scan Line polygon fill algorithm 3.4.2 Boundary Fill algorithm 3.4.3 Flood fill Algorithm 3.5 Polygon 3.5.1 Convex Polygons 3.5.2 Concave Polygons 3.6 Character generation

4.	<b>2D Geometry</b> 4.1 Basic Transformations <ul style="list-style-type: none"> <li>4.1.1 Translation</li> <li>4.1.2 Rotation</li> <li>4.1.3 Scaling</li> </ul> 4.2 Matrix Representations and Homogeneous Co-ordinates 4.3 Composite Transformations <ul style="list-style-type: none"> <li>4.3.1 Translation</li> <li>4.3.2 Rotations</li> <li>4.3.3 Scaling</li> <li>4.3.4 General Pivot Point Rotation</li> <li>4.3.5 General Fixed Point Scaling</li> <li>4.3.6 General Scaling Directions</li> </ul> 4.4 Inverse Transformation 4.5 Other Transformation <ul style="list-style-type: none"> <li>4.5.1 Reflection</li> <li>4.5.2 Zooming</li> <li>4.5.3 Panning</li> <li>4.5.4 Jaggies</li> </ul>
5.	<b>2D Viewing</b> 5.1 Viewing Pipeline 5.2 Windows to Viewpoint co-ordinate transformation 5.3 Clipping Operations 5.4 Point Clipping 5.5 Line Clipping <ul style="list-style-type: none"> <li>5.5.1 Cohen Sutherland Line Clipping</li> <li>5.5.2 Liang Barsky Line Clipping</li> </ul> 5.6 Polygon Clipping <ul style="list-style-type: none"> <li>5.6.1 Sutherland Hodgeman Polygon Clipping</li> <li>5.6.2 Weiler Atherton Polygon Clipping</li> </ul> 5.7 Text Clipping 5.8 Exterior Clipping
6.	<b>3D Geometry and Viewing</b> 6.1 Translation 6.2 Rotation <ul style="list-style-type: none"> <li>6.2.1 Coordinate Axes Rotation</li> <li>6.2.2 General Three Dimensional Rotations</li> </ul> 6.3 Scaling 6.4 Other Transformation <ul style="list-style-type: none"> <li>6.4.1 Reflections</li> <li>6.4.2 Shears</li> </ul> 6.5 Viewing Pipeline 6.6 Projection <ul style="list-style-type: none"> <li>6.6.1 Parallel projection</li> <li>6.6.2 Perspective projection</li> </ul>
7.	<b>Solid Surface Detection and Illumination</b> 7.1 Classification of Visible Surface Detection Algorithms 7.2 Back face detection 7.3 Depth buffer/ (Z-buffer, A-buffer) method 7.4 Scan Line method 7.5 Depth sorting method 7.6 Basic Illumination Models

	7.6.1 Ambient Light 7.6.2 Diffuse Reflection 7.6.3 Specular Reflection and the Phong Model
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## **LABORATORY EXPERIENCES**

1. Draw line using different line style
2. Draw the circle using Brezenham algorithm
3. Perform the operation of scaling for two dimension picture
4. Perform the operation of translation for two dimensional picture
5. Perform the operation of transformation for 3D picture
6. Perform the operation of windowing and clipping technique
7. Perform the operation of animation using segment technique
8. Perform the experiment to draw the polygon.
9. Draw the polygon using filling technique.
10. Draw the curve using B-spline algorithm.
11. Simple animations using built in functions in C.

## **Reference Books:**

1. Computer Graphics Donald Hearn &M Paulin Baker PHI
2. Computer Graphics Steven Harington MGH

