GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3150712
Semester – V
Subject Name: Computer Graphics

Type of course: Undergraduate

Prerequisite:----

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Syllabus:

Sr. No.	Content	Total Hrs.	% weightage
1	**Basic of Computer Graphics:** Basic of Computer Graphics, Applications of computer graphics, Display devices, Random and Raster scan systems, Graphics input devices, Graphics software and standards	06	15
2	**Graphics Primitives:** Points, lines, circles and ellipses as primitives, scan conversion algorithms for primitives, Fill area primitives including scan-line polygon filling, inside-outside test, boundary and flood-fill, character generation, line attributes, area-fill attributes, character attributers.	08	20
3	**2D transformation and viewing:** Transformations (translation, rotation, scaling), matrix representation, homogeneous coordinates, composite transformations, reflection and shearing, viewing pipeline and coordinates system, window-to-viewport transformation, clipping including point clipping, line clipping (cohen-sutherland, liang-bersky, NLN), polygon clipping	08	20
4	**3D concepts and object representation:** 3D display methods, polygon surfaces, tables, equations, meshes, curved lies and surfaces, quadric surfaces, spline representation, cubic spline interpolation methods, Bazier curves and surfaces, B-spline curves and surfaces	06	15
5	**3D transformation and viewing:** 3D scaling, rotation and translation, composite transformation, viewing pipeline and coordinates, parallel and perspective transformation, view volume and general (parallel and perspective) projection transformations	08	20
6	**Advance topics:** visible surface detection concepts, back-face detection, depth buffer method, illumination, light sources, illumination methods (ambient, diffuse reflection, specular reflection), Color models: properties of light, XYZ, RGB, YIQ and CMY color models	06	10

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Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15	20	15	10	5	5

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course outcomes: Students will be able to

Sr. No.	CO statement	Marks % Weightage
1	To understand the basic computer graphics primitives as well as able to implement them.	15
2	To learn, compare and apply various transformation techniques.	17
3	To design basic animations using latest graphics package software.	25
4	Students will be able to solve open design problems regarding surface and edge detection.	25
5	Students will be able to apply the knowledge, techniques, skills and modern tools tobecome successful professionals in graphics industries.	18

Reference Books:

1. Computer Graphics,D.Hearn And P.Baker - Pearson Eduction - C Version, Latest edition
2. Computer Graphics, with OpenGLHearn and Baker, - Pearson
3. Computer Graphics, Sinha &Udai, - TMH
4. Computer Graphics, Foley and van Dam - Person Education

List of Experiments:

1. To study the various graphics commands in C language.
2. Develop the DDA Line drawing algorithm using C language
3. Develop the Bresenham's Line drawing algorithm using C language
4. Develop the Bresenham's Circle drawing algorithm using C language
5. Develop the C program for to display different types of lines
6. Perform the following 2D Transformation operation - Translation, Rotation and Scaling
7. Perform the Line Clipping Algorithm
8. Perform the Polygon clipping algorithm
9. Perform the following tasks using MATLAB commands.
    - Read the grayscale and color image.
    - Display images on the computer monitor
    - Write images in your destination folder.

10. Generate the complement image using MATLAB.

Design based Problems (DP)/Open Ended Problem:

1. By using the various geometrics transformation techniques, students can develop the various gaming software and also able to perform the animation concept.

Major Equipment:

1. Computer systems with high RAM.

List of Open Source Software/learning website:

1. GIMP - GNU Image Manipulation Program
2. Inkscape - Open Source vector graphics editor
3. C Compiler
4. MATLAB/SciLAB