Course code: Course Title	Course Structure			Pre-Requisite
SE309: Computer Graphics	L	T	P	NIL
	3	0	2	

Course Objective: The objective of the course is to help students learn broad introduction to the theory and practice of computer graphics.

S. NO	Course Outcomes (CO)
CO1	Explain the fundamentals of computer graphics, applications, and graphic pipeline.
CO2	Apply and compare the algorithms for drawing 2D images also explain aliasing, anti-aliasing and half toning techniques.
CO3	Apply 2D and 3D transformations, including translation, scaling, rotation, reflection, shearing, affine transformation, and coordinate system conversions.
CO4	Analyze and apply clipping algorithms and transformation on 2D images.
CO5	Explain basic ray tracing algorithm, shading, shadows, curves and surfaces and also solve the problems of curves.

S. NO	Contents	Contact Hours
UNIT 1	**Overview of Computer Graphics:** Usage of Graphics and their applications, Over view of Graphics systems: Refreshing display devices, Random and raster scan display devices, Colour Models: RGB, HSV etc., Tablets, Joysticks, Track balls, Mouse and light pens, plotters, printers, digitizers.	6
UNIT 2	**Output Primitives:** DDA Line drawing algorithm, Bresenham's Line Drawing Algorithm, Mid-point circle algorithm, Mid-point Ellipse algorithms, filling algorithms, boundary fill and flood fill algorithms, scan- line filling, character generation, line attributes, fill styles, anti-aliasing.	8
UNIT 3	**Transformations:** Basic 2D Transformations, Matrix representations & Homogeneous Coordinates, Matrix Representations for basic 2D and 3D transformations, Composite Transformations, reflection and shear transformations, affine transformation, transformations between coordinate systems.	6
UNIT 4	**Two dimensional viewing**: The viewing Pipeline, Viewing Coordinate Reference Frame, Window-to-Viewport Coordinate Transformation, Two Dimensional Viewing Functions, Barky line clipping algorithm, Algorithm for polygon clipping, Sutherland-Hodgeman polygon clipping, Wailer-Atherton polygon clipping, curve clipping, Text clipping.	8
UNIT 5	**Curves and Surfaces:** Representation of surfaces, polygon meshes, plane equations, parametric cubic curves, Hermite Curves, Bezier Curves, 4 point and 5 point Bezier curves using Bernstein Polynomials, Conditions for smoothly joining curve segments, Bezier bi-cubic surface patch, B-Spline Curves, Cubic B-Spline curves using uniform knot vectors, Testing for first and second order continuities.	6
UNIT 6	**Shading and Hidden Surface Removal:** Shading, Illumination Model for diffused Reflection, Effect of ambient lighting, distances, Specular Reflection Model, Computing Reflection Vector, Curved Surfaces, Polygonal Approximations, Guard Shading, Phong Model, Hidden Surface Removal, Back Face Detection, Depth Buffer (Z-Buffer, A-Buffer) Method, Scan Line Method, Depth Sorting Method, Area Subdivision Method.	8
	TOTAL	**42**

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REFERENCES		
S.No.	**Name of Books/Authors/Publishers**	**Year of Publication / Reprint**
1	Donald Hearn, M. Baker, Warren Carithers, "Computer Graphics with OpenGL", Pearson, 4th Edition.	**2011**
2	Z. Xiang, R. Plastock "Computer Graphics", Schaum's Series, McGraw Hill Education.	**2006**
3	David F. Rogers, "Procedural Elements for Computer Graphics", McGraw Hill Education, 2nd Edition.	**2017**
4	D. Rogers and J. Adams, "Mathematical Elements for Computer Graphics", MacGraw- Hill, 2nd Edition.	**1989**
5	James D. Foley, Andries van Dam, Steven K. Feiner, John F. Hughes, "Computer Graphics Principles & practice", Addison-Wesley Professional, 2nd Edition.	**1996**

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