

Course Title	Advanced Computer Graphics
Course Code	CP212
Course Credit	Theory : 04
	Practical : 01
	Tutorial : 00
	Credits : 05
Course Objective	
<p>At the end of the course, students will be able to:</p> <ul style="list-style-type: none"> • Understand recent research in Computer Graphics, Modelling Geometry, Interactive Techniques, and Visualization. • Understand and design 3D modelling transformation and viewing. the graphics pipeline and an interactive render loop. • Develop and implement efficient and accurate surface modelling and solid geometry. • Understand and apply different visual surface determination, shading, shadow, transparency. • Understand the various color models and animation techniques. • Develop and demonstrate programming skills in 3D computer graphics 	

Detailed Syllabus		
Sr. No.	Name of chapter & details	Hours Allotted
Section – I		
1	Three Dimensional geometric and Modeling Transformations: Introduction, 3D Scaling, 3D Shearing, 3D Rotation, 3D Reflection, 3D Translation, Multiple Transformations, Rotation about arbitrary axis.	07
2	Three Dimensional projections Parallel Orthographic, Axonometric: trimetric, diametric, isometric, Oblique: Cavalier and cabinet and perspective: Single point, two point.	07

3	Representing Curves and Surfaces Polygon meshes, Parametric cubic curves, Hermit curves, Bezier curve, spline: uniform B-splines, non- uniform B-splines and β -splines, subdividing curves, Parametric bicubic surfaces: Hermite surfaces, Bezier surfaces, quadric surfaces.	08
4	SOLID MODELING Representing Solids, Regularized Boolean Set Operations, Primitive Instancing, Sweep Representations, Boundary Representation, Spatial-partitioning Representations, Constructive Solid Geometry, and Comparison of Representations.	06
Section – II		
4	Visual Realism: Why realism?, Rendering techniques for line drawings, Rendering technique for shaded images, improved object models, Dynamics, Improved displays, interacting with our other senses, Aliasing and antialiasing.	06
5	Visible-surface Determination Techniques for efficient visible-surface algorithms, algorithms for visible line determination, Z-buffer algorithm, List-priority algorithms, area subdivision algorithms, algorithm for Octree, algorithm for curved surface, visible-surface ray tracing.	06
6	Illumination and shading Illumination models, shading model for polygons, surface detail, shadows, Transparency, Recursive ray tracing, Radiosity methods.	06
7	Achromatic and Colored Light Achromatic light, chromatic color, color models for raster graphics.	06
8	Animation Design of animation sequences, general computer- animation functions, raster animation, key- frame system, morphing, simulating accelerations, motion specification, direct motion specification, goal-directed system.	04

Instructional Method and Pedagogy

- Lectures will be conducted with the aid of multi-media projector, blackboard, OHP etc. Assignments based on course contents will be given to the students at the end of each unit/topic and will be evaluated at regular interval
- Minimum five experiments shall be there in the laboratory related to course contents
- Minimum six tutorials which includes solution of minimum five computer programs in each head

Reference Books

1. James D. Foley, Andries Van Dam, "Fundamental of Interactive Computer Graphics", Addison-Wesley Publication.
2. David F. Rogers, "Procedural Elements for computer graphics", TMH.