

ADVANCED COMPUTER GRAPHICS (Major Elective – I)
Semester I (Computer Engineering)
SUB CODE: MECE106-C

Teaching Scheme (Credits and Hours)

Teaching scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract.	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
04	00	02	06	05	3	70	30	20	30	150

LEARNING OBJECTIVES:

The objective of this course is

- To Introduce various Graphics Applications in real world scenario
- To be familiar with image fundamentals and animations
- To be learn more about 2D, 3D and Curve applications
- Applying efficient graphics technique to solve engineering problems

OUTLINE OF THE COURSE:

Unit No	Topics
1	Review of Two Dimensional Graphics
2	Three Dimensions
3	Curves and Fractals
4	Solid Modeling
5	Achromatic and Color Light
6	Hidden Line and Surfaces
7	Illumination and Shading
8	Image Based Rendering
9	Animation
10	Graphics Hardware

Total hours (Theory): 60

Total hours (Practical): 30

Total hours: 90

DETAILED SYLLABUS

Sr. No	Topic	Lecture Hours	Weight age (%)
1	Review of two-dimensional graphics Transformations Windowing Clipping	06	05
2	Three Dimensions 3D geometry, primitives and transformations. Rotation about an arbitrary axis Parallel and perspective projection Viewing parameters 3D clipping and viewing transformation	06	15
3	Curves and Fractals Polygon Meshes Parametric Cubic curves: B-spline, Bezier, Hermite. Parametric Bicubic Surfaces Quadric surfaces Fractals: fractal lines and surfaces Applications	08	15
4	Solid Modeling Representing solids Regularized Boolean Set Operations Primitive Instancing Sweep and Boundary Representations Spatial-partitioning Representations Constructive Solid Geometry User Interface for Solid Modeling	08	15
5	Achromatic and Colored Light Achromatic light, Gamma correction, Halftone approximation, Chromatic Color CIE chromaticity diagram, Color models for Raster Graphics. Using Color in Computer Graphics	08	15
6	Hidden Lines and Surfaces Algorithms for Visible-Line and Surface determination: z-buffer, List priority, Scan line, Area Subdivision, Ray Tracing	06	10
7	Illumination and Shading Surface detail, shadows and Transparency Inter object Reflections Illumination Models Extended Light Sources Recursive Ray Tracing	08	10
8	Image based Rendering Introduction comparison with geometry based rendering	06	05

	applications		
9	Animation Introduction morphing character animation and facial animation	02	05
10	Graphics Hardware Special-purpose computer graphics processors and accelerators	02	05

INSTRUCTIONAL METHOD AND PEDAGOGY (Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lecture and laboratory which carries 10 marks in overall evaluation.
- One internal exam will be conducted as a part of internal theory evaluation.
- Assignments based on the course content will be given to the students for each unit and will be evaluated at regular interval evaluation.
- Surprise tests/Quizzes/Seminar/tutorial will be conducted having a share of five marks in the overall internal evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

STUDENTS LEARNING OUTCOMES:

On successful completion of the course, the student will:

- Be able to Compare various graphics algorithm used in 2D and 3D
- Be able to understand fundamentals of graphics used in various real life applications.
- Be able to understand and identify the performance characteristics of graphics algorithms. Employ algorithm to model engineering problems, when appropriate.

REFERENCE BOOKS:

6. Computer Graphics: principals and practice Foley, vanDam, Feiner Hughes Addison Wesley
7. Mathematical Elements of Graphics Roges Tata McGrow Hill
8. Computer Graphics Donald Hearn and M.Pauline Baker Prentice Hall India
9. Procedural Elements-Computer Graphics, David Rogers, TMH
10. Principals of Computer graphics, Shalini Govil-pal, springer

LIST OF PRACTICALS

Sr. No	Name of Experiment
1	To perform open GL program for Bezier Curve.
2	To perform Bezier curve with c^0 and c^1 continuity.
3	To Draw cube with or without back face culling.
4	To perform Hermite Curve.
5	To perform program for diffuse illumination.
6	To perform program for sphere with Back face culling.
7	To perform program for Ambient and diffuse light source.
8	To perform program for ambient & specular & diffuse light source.
9	To perform program for Diffuse only light source.
10	To perform Z buffer visible surface Algorithm
11	To perform open GL program for Bezier Curve.