COMPUTER GRAPHICS [EX] - SYLLABUS

Lecture : 3 Year : III

Tutorial : 1 Part : I

Practical : 1.5

Course Objectives:

 To familiarize with graphics hardware, line and curve drawing techniques, techniques for representing and manipulating geometric objects, illumination and lighting models. .

1. Introduction and application [2 hours]

History of computer graphics, Applications of computer graphics, Hardware: Raster-Scan Displays, Vector Displays, Hard copy devices, Input Hardwares, Display Architectures, Applications in various fields like medicine, engineering, art, uses in virtual realism.

2. Scan-Conversion [6 hours]

2.1. Scan-Converting A Point
2.2. Scan-Converting A Straight Line: DDA Line Algorithm, Bresenham's Line Algorithm
2.3. Scan-Converting a Circle and an Ellipse: Mid-Point Circle and Ellipse Algorithm

3. Two –Dimensional Transformations [6 hours]

3.1. Two –dimensional translation, rotation, scaling, reflection, shear transforms
3.2. Two-dimensional composite transformation
3.3. Two-dimensional viewing pipeline, world to screen viewing transformations and clipping (Cohen-Sutherland Line Clipping, Liang-Barsky Line Clipping)

4. Three-Dimensional Graphics [6 hours]

4.1. Three –dimensional translation, rotation, scaling, reflection, shear transforms

4.2. Three-dimensional composite transformation

4.3. Three-dimensional viewing pipeline, world to screen viewing transformation, projection concepts (orthographic, parallel, perspective projections)

5. Curve Modeling [4 hours]

Introduction to Parametric cubic Curves, Splines, Bezier curves

6. Surface modeling [4 hours]

Polygon surface, vertex table, edge table, polygon table, surface normal and spatial orientation of surfaces

7. Visible Surface Determination [6 hours]

7.1. Image Space and Object Space techniques

7.2. Back Face Detection, Z-Buffer, A-Buffer, Scan-Line method

8. Illumination and Surface Rendering methods [8 hours]

8.1. Algorithms to simulate ambient, diffuse and specular reflections

8.2. Constant , Gouraud and phong shading models

9. Introduction to Open GL [3 hours]

Introduction to OpenGl, callback functions, Color commands, drawing pixels, lines, and polygons using OpenGL, Viewing, Lighting.

Practical:

There shall be 5 to 6 lab exercise including following concepts:

1. DDA Line Algorithm
2. Bresenham's Line algorithm
3. Mid Point Circle Algorithm
4. Mid Point Ellipse Algorithm

5. Lab on 2-D Transformations

6. Basic Drawing Techniques in OpenGL

Text Book:

Donald Hearn and M. Pauline Baker, "Computer Graphics C version (2nd edition)"

Reference

1. Donald D. Hearn and M. Pauline Baker, "Computer Graphics with OpenGL (3rd Edition)"
2. Foley, Van Dam, Feiner, Hughes "Computer Graphics Principles and Practice (Second Edition in C")

Evaluation Scheme:
The question will cover all the chapters of the syllabus. The evaluation scheme will be as indicated in the table below:

Units	Hrs	Mark Distribution
1	2	4
2	6	10
3	6	10
4	6	10
5	4	8
6	4	8
7	6	10
8	8	14
9	3	6
Total	45	80

*There may be minor variation in marks distribution.