CSPE3014 COMPUTER GRAPHICS & ANIMATION (3-0-0)

Course Objectives:

- To understand the principles and techniques of computer graphics.
- To explore 2D and 3D graphics algorithms.
- To develop knowledge of animation techniques and multimedia systems.

Module – I: (06 Hours)

Introduction:

Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices. Output primitives: Points and lines, line drawing algorithms (Bresenham's and DDA Algorithm), mid-point circle and ellipse algorithms. Polygon Filling: Scan-line algorithm, boundary-fill and flood-fill algorithms

Module – II: (08 Hours)

2-D geometrical transforms:

Translation, Scaling, Rotation, Reflection and Shear transformations, Matrix representations and homogeneous coordinates, Composite transforms, Transformations between coordinate systems.

2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Clipping, line clipping, Cohen-Sutherland algorithms, Sutherland Hodgeman polygon clipping algorithm.

Module – III: (08 Hours)

3-D object representation and transformation:

Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods.

3D transformation and viewing: 3D translation - rotation and scaling - reflection, shear, composite transformation - viewing pipeline and coordinates - parallel and perspective transformation - view volume and general (parallel and perspective) projection transformations.

Module – IV: (10 Hours)

Visible Surface Detection and computer graphics algorithm:

Image space and object space techniques, Hidden Surface removal—Depth comparison, Z-Buffer Algorithm, Back-Face Removal, The Painter's Algorithm, Scan-Line Algorithm- BSPtrees , Area sub-division method - Ray tracing, Light and Colour and different colour models (RGB, CMY, YIQ).

Module – V: (10 Hours)

Animation:

Basic Principles of Animation and Types of Animation, Introduction to the flash interface, Setting stage dimensions, working with panels, panel layouts, Layers & Views, Shaping Objects – Overview of shapes, Drawing & Modifying Shapes, Bitmap Images & Sounds, Morphing, Animation -Principles, Frame by frame animation, twining, masks, Introduction to virtual reality.

Course Outcomes (CO):

After completing this course, students will be able to:

1. Describe the fundamentals and applications of computer graphics.
2. Implement 2D and 3D geometric transformations and rendering algorithms.
3. Apply lighting and shading models to generate realistic images.
4. Design and animate objects using key framing and morphing techniques.
5. Use graphics libraries/tools to develop interactive graphics and animation applications.

Text Books:

1. "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearson Education.
2. Computer Graphics Principles & practice", second edition in C, Foley, Van Dam, Feiner and Hughes, Pearson Education.
3. Computer Graphics, Steven Harrington, TMH .

Reference Books:

1. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
2. Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
3. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.