BCA501: Computer Graphics and Animation	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	**Examination Scheme** Class Test – 12 Marks Teachers Assessment – 6 Marks Attendance – 12 Marks End Semester Exam – 70 Marks

Prerequisite: Linear Algebra, Matrix, and C-Programming.

Course Objectives:

1. To introduce the use of the components of a graphics system and become familiar with building approach of graphics system components and algorithms related with them.
2. To learn the basic principles of 2- dimensional and 3- dimensional computer graphics.
3. Provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.
4. Provide an understanding of mapping from a world coordinate to device coordinates, clipping, and projections.
5. To be able to discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.
6. To comprehend and analyze the fundamentals of animation, virtual reality, underlying technologies, principles, and applications.

Detailed Syllabus:

Unit-1 **Introduction to computer graphics:** Types of computer graphics, Graphic Displays- Random scan displays, Raster scan displays, Color CRT, Flat panel displays, Frame buffer and video controller, interactive input and output devices.
Unit-2 **Line drawing algorithms:** DDA, Bresenham. **Circle generating algorithms:** Midpoint circle generating algorithm, Bresenham circle generating algorithm. **Ellipse generating algorithms:** Midpoint ellipse generating algorithm, Bresenham ellipse generating algorithm.
Unit-3 **Polygon Filling:** Scan line Polygon filling Algorithm, Boundary fill Algorithm, Flood fill Algorithm. **2D Transformations:** Basic transformation, Matrix representations and homogenous coordinates, Composite transformations, Reflections and shearing.
Unit-4 **Segment and Display files**: Segments, Functions for segmenting the display file, Posting and un-posting a segment, segment naming schemes, Default error conditions, Appending to segments, Refresh concurrent with reconstruction, Free storage allocation, display file structure. Interactive picture construction techniques.
Unit-5 **Windowing and Clipping:** Viewing pipeline, Viewing transformations, 2-D Clipping algorithms- Line clipping algorithms such as Cohen Sutherland line clipping algorithm, Liang Barsky algorithm, Line clipping against non rectangular clip windows; Polygon clipping – Sutherland Hodgeman

polygon clipping, Weiler and Atherton polygon clipping, Curve clipping, Text clipping.
Unit-6 **Three Dimensional:** 3-D geometric primitives, 3-D Transformation, 3-D viewing, projections, 3-D Clipping. **Curves and Surfaces:** Quadric surfaces, Spheres, Ellipsoid, Blobby objects, introductory concepts of Spline, Bezier curves and surfaces.
Suggested Readings: 1. Computer Graphics-C Version, Donald Hearn, M. Pauline Baker, Pearson Education, 2007 2. Computer graphics, Schaum's outline, TMH, 2006. 3. Computer Graphics: A Programming Approach, Steven Harrington, TMH, 1984. 4. Computer Graphics Principles and Practice, James D Foley, Pearson education 2004.

Course Outcomes:

1. Have a knowledge and understanding of the structure of an interactive computer graphics system, and the separation of system components.
2. Have a knowledge and understanding of geometrical transformations and 3D viewing.
3. Have a knowledge and understanding of techniques for representing 3D geometrical objects.
4. Have a knowledge and understanding of interaction techniques.
5. Create interactive graphics applications.
6. Use C builds functions or equivalent graphics tools.
7. Perform simple 2D graphics with lines, curves and can implement algorithms to rasterizing simple shapes, fill and clip polygons and have a basic grasp of anti-aliasing techniques.