Devi Ahilya University, Indore, India Institute of Engineering & Technology				**IV Year B.E. (Information Technology (Full Time)**			
Subject Code & Name	**Instructions Hours per Week**			**Credits**			
ITR7C2	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
Computer Graphics	**3**	**1**	**2**	**3**	**1**	**1**	**5**
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To provide knowledge of different techniques used for visual object representation.
- Familiarize students with different hardware/ software and algorithm implementation used by today's input/output devices.
- Develop skills to design and implement various 2D/3D objects representation in virtual reality.
- Learning about the basics of computer based games and data visualization.

Pre requisites:

Programming language: C++/JAVA.

COURSE CONTENTS

UNIT-I

Introduction: Application of Computer Graphics, Raster Graphics Fundamentals: Scan conversion, Pixel, Frame Buffer. Graphics Primitives; Line algorithms Circle algorithms, Ellipse, Character generation, Polygon Representation, inside test, Polygon filling algorithms, Antialiasing.

UNIT-II

Display devices: Random scan and Raster scan monitors, Colors CRT monitor, Plasma Panel; Hard Copy devices: Printers and Plotters; Input devices: Joysticks, Mouse, Digitizer, Scanner, and Camera; Input Techniques;

UNIT-III

Windowing and clipping: 2D Transformation, Raster method of Transformation, Window, View port, Viewing, Window to View port Transformation, Line clipping algorithms, Polygon clipping algorithms.

UNIT-IV

Three Dimensions:3D Modeling techniques, 3D Display Techniques, 3D Transformation, Viewing Parameters, Hidden Surface and back face removal algorithms. 3D Curves & Surfaces: Bezier, B spline.

UNIT-V

Shading and Color Models: Diffuse illumination, Point source illumination, Reflection, Refraction, Transparency, Shadows, Polygon rendering algorithms, Dithering, Half toning, Color Models and applications.

Learning Outcomes:

Upon completing the course, students will be able to:

- Able to learn the basics of2D/3D design and it implementations.
- Able to write programs for latest Input/ Output Devices and Human computer Interaction.
- Students will be aware about the latest technology used in display technology.

BOOKS RECOMMENDED:

[1] Hearn Donald and Baker M.Pauling, Computer Graphics, 2/e, Prentice Hall of India.
[2] Hearn Donald and Baker M.Pauling, Computer Graphics with OpenGL, 3/e, Prentice Hall, 2004.
[3] David F. Rogers, Procedural Element of computer Graphics, McGraw Hill International.
[4] William M. Newman Robert F. Sproull, Principles of Interactive Computer Graphics, McGraw
Hill.
[5] J.D. Foley, A. van Dam, S.K. Feiner, J.F. Hughes, and R.L. Philips, Introduction to ComputerGraphics, Addison-Wesley, 1994. [6] Zhigang Xiang and Roy Plastock, Computer Graphics, Tata McGraw Hill Publications.

List of Practical Assignments:

1. Implement various line drawing algorithm & compare it on the basis of performance and prepare the table.
2. Implement various Circle drawing algorithm & compare it on the basis of performance and prepare the table.
3. Implement Cohen Sutherland and Cyrus Back line clipping algorithms and display the clipped portion of line as demonstration.
4. Implement Cohen Hoghman polygon clipping algorithm to clip a polygon against a rectangular boundary and combine Cohen Hoghman polygon clipping algorithm with Cyrus Back line clipping algorithms to clip a polygon against another polygon and display the clipped portion of polygon.
5. Implement the following 2D transformation using matrix multiplication: Translation Rotation Scaling Shearing Reflection
6. Implement parallel (oblique and axonometric) and perspective projection and display following objects using projections: Pyramid and Rectangles
7. Implement the following 3D transformation using matrix multiplication. And display using perspective projection: Translation Rotation Scaling Shearing Reflection
8. Implement rotation of an object about any arbitrary axis.
9. Implement reflection of an object about any arbitrary plane. 11. Implement the L-system for generation of symmetric objects (Fractals)
10. Generate 2D curve and surfaces using implementation of Bezier curve.
11. Implement the following visible surface detection algorithm and compare them on the basis of complexities and execution time. Z-buffer Scan-line Depth sorting Octree Ray Casting

12. Implement the following rendering algorithm and compare them on the basis of complexities and execution time. Flat Shading Gouraud shading Phong shading Ray tracing.
