# 20CS31E3 - COMPUTER GRAPHICS

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| Course Category: | Professional Elective | Credits: | 3 |
| Course Type: | Theory | Lecture-Tutorial-Practical: | 3-0-0 |
| Prerequisite: | Familiarity with the theory and use of coordinate geometry and basics of linear algebra and Algorithm fundamentals. | Sessional Evaluation:  Univ. Exam Evaluation:  Total Marks: | 40  60  100 |
| Objectives: | * Understand the fundamental concepts and theory of computer graphics * Understand modeling, and interactive control of 3D computer graphics applications * The underlying parametric surface concepts be understood * Learn multimedia authoring tools. | | |

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| Course Outcomes | Upon successful completion of the course, the students will be able to: | |
| CO1 | Understand the basics of computer graphics, different graphics systems and applications of computer graphics. |
| CO2 | Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis. |
| CO3 | Use of geometric transformations on graphics objects and their application in composite form. |
| CO4 | Describe the fundamentals of parametric curves and surfaces, and spotlighting. |
| CO5 | Explore projections and visible surface detection techniques for display of 3D scene on 2D screen |
| CO6 | Render projected objects to naturalize the scene in 2D view and to learn animated tools |
| Course Content | UNIT-I  **INTRODUCTION:** Application areas of computer graphics, Overview of graphic system, Video- display devices, Raster-scan systems, Random scan systems, Graphics monitors and Work stations and Iinput devices.  UNIT-II  **OUTPUT PRIMITIVES:** Points and lines, Line drawing algorithms, Mid-point circle algorithm, Filled area primitives: Scan-line polygon fill algorithm, Boundary-fill and Flood-fill algorithm.  UNIT-III  **2-D GEOMETRICAL TRANSFORMATIONS:** Translation, Scaling, Rotation, Reflection and Shear transformation matrix representations and Homogeneous coordinates, Composite transformations, transformations between coordinates.  **2-D VIEWING**: The viewing pipeline, Window to View-port coordinate transformations, Cohen-Sutherland line clipping.  UNIT-IV  **3-D OBJECT REPRESENTATION:** Spline representation, Hermite curve, Bezier curve and B- spline curve, Polygon surfaces, quadric surfaces, Bezier and B-spline surfaces, Basic illumination models, Polygon rendering methods.  UNIT-V  **3-D GEOMETRIC TRANSFORMATIONS:** Translation, rotation, scaling, reflection and shear transformation and composite transformations.  **3-D VIEWING:** Viewing pipeline, viewing coordinates, view volume and general projection transforms.  UNIT-VI  **VISIBLE SURFACE DETECTION METHODS:** Classification, back-face detection, depth-buffer, scan-line, depth sorting.  **COMPUTER ANIMATION:** Design of animation sequence, general computer animation functions, raster animation, computer animation language, key frame system, motion specifications. | |
| Text Books &  Reference  Books | **TEXT BOOKS:**   1. Computer Graphics C version, Second edition by Donald Hearn and M. Pauline Baker, Pearson/PHI, 2002 2. Computer Graphics Principles & Practice, Second edition in C/ Foley, VanDam, Feiner and Hughes/Pearson Education, 2013   **REFERENCE BOOKS:**   1. Computer Graphics Second edition, Zhigandxiang, Roy Plastock, Schaum’s outlines, Tata Mc- Graw hill edition,2002. 2. Procedural elements for Computer Graphics, David F Rogers, Tata McGraw hill, 2nd edition,1988. 3. Principles of Interactive Computer Graphics, Neuman and Sproul, TMH, 1979. 4. Computer Graphics, Steven Harrington, TMH, 1987. | |
| E-Resources | 1. <https://nptel.ac.in/courses> | |