# COMPUTER GRAPHICS
## (Elective - II)

**Subject Code: 13ME2120**

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**Pre requisites:** Computer Aided Design

**Course Educational Objectives:**

To make the student understand

1. basics of colour raster scan display devices and draw lines and circles on it
2. fill polygons and clip lines and polygons against a window
3. procedures for transformation, rendering and shading of objects
4. hidden line removal algorithms

**Course Outcomes:**

The student will be able to

1. draw lines and circles on colour raster scan display devices
2. fill polygons and clip lines and polygons against a window
3. transform, render and shade objects
4. eliminate hidden lines and surfaces using algorithms

**UNIT – I**

Transformations: Cartesian and homogeneous coordinate systems two dimensional and three dimensional transformations – scaling, rotation, shearing, zooming, viewing transformation, reflection, rotation about an axis, concatenation

**UNIT –II**

Surface generation: Shape description requirements, parametric functions, Bezier methods, Bezier curves, Bezier surfaces, B-Spline methods

**Unit –III**

Mesh generation: Meshes, Mesh elements, types of mesh operations , mesh representation, traversal operations , Face based mesh representation, Half edge data structures, Constructing a mesh data structure, constructing a half edge base mesh data structure, sub division of surfaces, subdivision of splines, Constructing rules, Examples.

**UNIT-IV**

Solid modeling: Introduction to solid modelling, Implicit representation: primitives and skeletal elements, combination of fields – Boolean operations, polygonization, Solids modeling by boundary representation and CSG.

**UNIT- V**

Rendering and shading algorithms: Rendering - Hidden line removal algorithms, surface removal algorithms, painters, Warnock, Z-buffer algorithm

Shading algorithms - Constant intensity algorithm, Phong's shading algorithm, Gourand shading algorithm, comparison of shading algorithms

**TEXT BOOKS:**

1. D.F.Rogers , "*Procedural elements for computer graphics*", 2e, TMH, 1998.

2. Donald Hearn & M.P. Bakers, " *Computer Graphics*", 2e, Prentice-Hall, 1994.

**REFERENCES:**

1. Harrington, "*Computer graphics*", 2e, TMH, 1987.

2. Smartech.gatech.edu/bitstream/ handle.