COMPUTER GRAPHICS

(Elective - I)

Course Code: 15ME2108

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Course Outcomes: At the end of the course, the student will be able to

CO1: Devise transformations such as translation, rotation and reflection etc. of objects

CO2: Generate Bezier curves, Bezier surfaces and B-spline curves

CO3: Generate and construct meshes

CO4: Differentiate CSG and B-rep solid modellers

CO5: Develop algorithms to remove hidden surfaces, render and shade objects

UNIT – I (10-Lectures)

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 (10-Lectures)

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

Unit –III (10-Lectures)

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 (10-Lectures)

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 (10-Lectures)

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

Shading algorithms - Constant intensity algorithm, Phongs 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.