

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVES: Computer graphics is used in diverse applications from the visualization of complex scientific data to the special effects in computer games. The objective of this course is to introduce the programming principles of computer graphics. The course will cover Practical programming through C, and mathematical and theoretical foundations.

PRE-REQUISITE:

- Mathematical Concepts

UNIT-I

Scan conversion: Scan converting a point, line (Bresenham's, DDA), 2-D transformations (Rotation, Rotation about an arbitrary line, Scaling, Translation, Shearing, Reflection, and Reflection about an arbitrary line), circle and ellipse.

Transformation: 2D transformation, Basic Transformation, Various 2D and 3D Transformation matrices (Translation, Rotation, Scaling, Shearing and Reflection), Composite transformations: Reflection, Shearing and Transformation between coordinate Systems. Rotation about : (i) an arbitrary axis (ii) about an arbitrary point. [No. of Hrs: 10]

UNIT-II

Curves and Surfaces Bezier Curves, 4 point and 5 point Bezier curves using Bernstein Polynomials, Conditions for smoothly joining curve segments, Bezier bi-cubic surface patch, B-Spline Curves, Cubic B-Spline curves using uniform knot vectors, first and second order continuities, Effect of multiple control points at same location, Geometrical Construction, Computing control points given end slopes for a specified curve segment. [No. of Hrs: 10]

UNIT-III

Transformations: 3-D Transformation, Computing location of V.P, 2-D viewing, Window-to-view port transformation

Clipping: Line Clipping; Sutherland Cohen clipping algorithms, Sutherland-Hodgeman.

Projection: Parallel and Perspective Projections

Solid Modeling: Sweeping a polygon or a surface patch along a path to form solids, Boundary Representation (B-Rep), octrees, CSG – Constructive Solid Geometry. [No. of Hrs: 10]

UNIT-IV

Shading: Shading, Illumination Model for diffused Reflection, Effect of ambient lighting & distances, Specular Reflection Model, Computing Reflection Vector, Curved Surfaces, Polygonal Approximations, Gourard Shading, Phong Model.

Hidden Surface Removal: Floating Horizon Method, Depth Buffer (Z-Buffer, A-Buffer) Method, Scan Line Method, Depth Sorting Method, BSP- tree Method, Area Subdivision Method. [No. of Hrs: 12]

TEXT BOOKS:

1. Foley James D, "Computer Graphics", AW 2nd Ed.
2. Rogers, "Procedural Element of Computer Graphics", McGraw Hill.
3. Donnald Hearn and M. Pauline Baker, "Computer Graphics", PHI.

REFERENECS:

1. Ven Harrington, "Computer Graphics: A programming Approach", TMH.
2. Newman and Sproul, "Principal of to Interactive Computer Graphics", McGraw Hill.
3. Roge and Adams, "Mathematics Element of Computer Graphics", McGraw Hill.
4. R. Plastock and G Kalley, "Theory and Problems of Computer Graphics", Schaum's Series, Mc Graw Hill, 1986.
5. F. S. Hill, Jr. Stephen M. Kelley, "Computer Graphics using Open GL", PHI, 3rd Ed., 2009.
6. Malay K. Pakhira, "Computer Graphics Multimedia Animation", PHI, 2008.