

SYLLABUS

Punjab Technical University

SEMESTER I

Paper Code: MS-39

Paper Title: Computer Graphics

Maximum Marks: 80

Number of Lectures: 90
(45 minutes duration)

L	P
6	8

Objectives: This paper enables students to understand graphics hardware and various 2D and 3D algorithms. After the completion of this paper, student will be able to:

- Implement the principles and commonly used paradigms and techniques of computer graphics.
- Use OpenGL proficiently using C/C++.

Note:

- (i) The Question Paper will consist of Four Units.
- (ii) Examiner will set total of NINE questions comprising TWO questions from each Unit and ONE compulsory question of short answer type covering whole syllabi.
- (iii) The students are required to attempt ONE question from each Unit and the Compulsory question.
- (iv) All questions carry equal marks unless specified.

Unit-I

1. Introduction to Computer Graphics: Overview of Graphics Systems, Display Devices, Hardcopy Devices, Interactive Input Devices, Pointing and positioning devices (cursor, light pen, digitizing tablet, the mouse, track balls), Display Processors, Character Generation; Interactive graphical techniques; Positioning, (Elastic or Rubber Band lines, Inking, zooming, panning)

2. Raster Scan Graphics: Line Drawing algorithms-Direct method, DDA and Bresenham's; Circle drawing algorithm 2 point, 4-point, trigonometric method, 8-point, Bresenham method, Bresenham Midpoint method.

Unit-III

3. Two Dimensional Geometric Transformation & Viewing:

Homogeneous Coordinate System; Basic Transformations- Translation, Rotation, Scaling, Reflection, Shear, Composite Transformation like Rotation about an Arbitrary Point, Reflection through an Arbitrary Line; transformation of points and unit square. Exam

4. Clipping: Point clipping Line clipping algorithms; Cyrus-Beck, Cohen-Sutherland and Liang-Barsky, Polygon Clipping; Window to Viewport coordinate transformation.

Unit-III

5. Graphics Programming using C/C++: Basic Graphical functions; Mouse Programming, Graphic Languages: Primitives (Constants, actions, operators, variables), display subroutines, plotting and geometric transformations, Concept of Animation, Saving, Loading and Printing graphics images from/to disk. Animated algorithms for sorting, Towers of Hanoi.

6. Open GL using C/C++: Geometric Primitives and Attributes; Viewing; Color; Lighting, Animation.

Unit-IV

7. Three Dimensional Concepts & Object Representations: Three Dimensional Display Methods, Parallel Projection, Perspective projection; Translation, Rotation, Scaling, Composite Transformation; Hidden line and surface elimination-Z-buffer, back face, scan line, depth sorting.

8. Shading- Modelling light intensities- flat shading, gouraud shading, phong shading. Representation of Space Curves, Cubic Splines, Bezier Curves, B-spline Curves, B-spline Curve Fit, B-spline Curve Subdivision, Parametric Cubic Curves, Quadric Surfaces, Bezier Surfaces.