GUJARAT UNIVERSITY

K. S. SCHOOL OF BUSINESS MANAGEMENT

M.Sc. IN COMPUTER APPLICATIONS AND INFORMATION TECHNOLOGY

[Five Years' (Full-time) Integrated Degree Course]

Fifth Semester M.Sc. (CA & IT)

KS_C_CC -354 Computer Graphics

---

3 credit course

Objective:

Understanding of 2D and 3D Graphics and graphics display devices, Understanding basic primitives their attributes and apply transformations on them, Knowledge of 2D and 3D geometry, matrices, basic trigonometry, basics of computer programming and data structures.

UNIT I: **(20%)**

- Point, Lines, Line segments, Vectors, Pixels and frame buffers
- **Display devices:-** Refresh CRT, Raster scan and random scan displays, color CRT monitors, Direct view storage tubes, Flat panel displays
- **Line drawing algorithms:-** DDA and BRESENHAM

UNIT II: **(20%)**

- **Introduction to random scan concepts: -** Attributes of line color, width, style, caps and joins. Character generation Primitive operations, Display file interpreter, Normalized device coordinates, Display file structure, Display File algorithms, Display control, Text.

UNIT III: **(20%)**

- **Polygons: -** Types of Polygons, Polygon representation, Inside-Outside tests, Polygon Interfacing Algorithms, Polygon filling algorithm, filling with a pattern
- **2-D Geometric Transformations: -** Basic Transformations-translation, Rotation, Scaling, Homogeneous coordinate systems, Composite transformations, other transformations-Reflection, shear.

UNIT IV: **(20%)**

- **Viewing and Clipping: -** Viewing pipeline, viewing coordinate reference frame, window-to viewport coordinate transformation, Clipping- Point clipping, Line clipping algorithms-Cohen Sutherland, Liang Barsky. Polygon clipping algorithms- Sutherland Hodgeman, Weiler-Atherton, Curve clipping, text clipping, exterior clipping
- **Segments: -** Introduction, The segment table, Segment Creation, Closing a segment, deleting a segment, renaming a segment, Visibility Image transformation, saving and showing segments

UNIT V: **(20%)**

- **Introduction to 3-D geometry: -** Depth cueing, visible line and surface identification, surface rendering, exploded cutaway views, stereoscopic views, Parallel Projection, Perspective projection, 3D transformations, Overview of 3D viewing and clipping

Recommended Lecture Scheme: Approximately 45 hours of classroom teaching,

Recommended Practical Scheme: Applicable

Assignment: One assignment every month.

Text Books:

1. Computer Graphics 'C' Version
   By Donald Hearn,M.Pauline Baker, Second Edition, Pearson Education
2. Computer Graphics: A programming approach
   By Steven Harrington, Second Edition, McGraw -Hill, 1987

Reference Books:

1. ComputerGraphics: Principles and Practice
   By J. Foley, A.van Dam, S. Feiner, and J. Hughes, Addison-Wesley, 1990.
2. Principles of Interactive Computer Graphics
   By W. Newman and R. Sproull, Second Edition, McGraw-Hill.
3. Theory and Problems of Computer Graphics
   By R. Plastock and G. Kalley, McGraw-Hill International Edition, 1986.

Chapter -wise coverage of syllabus from Text book:

For Unit I of this syllabus
- Text Book #1: **Chapter 2**
- Text Book #2: **Chapter 1**

For Unit 2 of this syllabus
- Text Book #1: **Chapter 3**
- Text Book #2: **Chapter 2 & 3**

For Unit 3 of this syllabus
- Text Book #1: **Chapter 5**
- Text Book #2: **Chapter 3**

For Unit 4 of this syllabus
- Text Book #1: **Chapter 6**
- Text Book #2: **Chapter 5**

For Unit 5 of this syllabus
- Text Book #1: **Chapter 9, 11 & 12**