

MCA 302: Computer Graphics

UNIT-I

Overview of Graphics systems, Application areas of Computer Graphics, video-display devices, Raster-scan systems, random scan systems, graphics monitors and workstations and input devices. Output primitives points and lines, line drawing algorithm, mid-point circle and ellipse algorithms.

UNIT-II

Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms. 2-D Geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates.

UNIT-III

2-D Viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland - Hodge man polygon clipping algorithm.

UNIT-IV

3-D Object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-spline curves, Bezier and B-spline surfaces. Basic illumination models, polygon rendering methods.

UNIT-V

3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations, 3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.

Computer Animation: Design of animation sequence, general computer animation functions, Raster animations, Computer animation, languages, Key frame systems

Text Book:

1. Donald Hearn and M. Pauline Baker, Computer Graphics C Version, Second Edition, Pearson Education, 2005.

Reference Book:

1. Steven Harrington (1987), Computer Graphics - A Programming Approach, Second Edition, McGraw - Hill International Editions.
2. William M. Newman and Robert F. Sprawl (1979), Principles of Interactive Computer Graphics, second Edition, McGraw-Hill International Editions.

**MASTER OF COMPUTER APPLICATIONS DEGREE EXAMINATION,
MARCH - 2024**

THIRD SEMESTER

PAPER : MCA 302 : COMPUTER GRAPHICS

(Under C.B.C.S. New Regulations w.e.f. 2020-2021)

(Common Paper to University and all Affiliated colleges)

Time : 3 Hours

Max. Marks : 70

PART - A

(Compulsory)

Answer any FIVE of the following questions. Each question carries 4 marks. (5×4=20)

1. a) Define the terms pixel, aspect ratio, resolution and frame buffer.
- b) Write about character generation and bundled attributes.
- c) Draw line from (0,0) to (6,7) using simple DDA algorithm, rasterize this line.
- d) Derive transformation matrix, when point P(x, y) is reflected about line $y = mx + c$.
- e) Write about curve and text clipping with example.
- f) Explain window to view port transformation
- g) What is shear transformation? Explain X-shear and Y-shear with example.
- h) Write short notes raster animations.
- i) Briefly explain about spline representation.
- j) Write about different types of parallel projection.

PART - B

Answer FIVE questions, choosing ONE question from each Unit. Each question carries 10 marks. (5×10=50)

UNIT - I

2. a) Explain about working of CRT monitors with neat diagram.
- b) Explain beam-penetration and shadow mask technique.

(OR)

3. Illustrate midpoint circle drawing algorithm with example. Assume 10 cm as the radius and co-ordinate as the center of the circle.

UNIT - II

4. a) Perform the 45° rotation of triangle A(0, 0), B (1, 1), C (5, 2) about point P(-1, -1)
b) Prove that two successive 2-D rotation are additive i.e., $R(\theta_1) \cdot R(\theta_2) = R(\theta_1 + \theta_2)$.

(OR)

5. Explain about scan line polygon fill algorithm.

UNIT - III

6. Illustrate Cyrus - beck line clipping algorithm with suitable example.

(OR)

7. Consider a rectangle with left bottom corner at (0,0) and right top corner at (8,4). Clip the line P_1P_2 with vertices $P_1(-1,1)$ and $P_2(9,3)$ against the given rectangle using Cohen Sunderland clipping algorithm.

UNIT - IV

8. Discuss about different Illumination models in detail.

(OR)

9. Explain about splines and Bezier curves and its mathematical representations.

UNIT - V

10. Derive 3-D translation and rotation matrices with respect to co-ordinate axis.

(OR)

11. Describe the features of different computer animation languages.

MASTER OF COMPUTER APPLICATIONS DEGREE EXAMINATION, JULY - 2022

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PART - A

(Compulsory)

Answer any **FIVE** of the following questions. Each question carries **4** marks. **(5×4=20)**

1.
 - a) Describe the Application areas of Computer Graphics.
 - b) Differentiate between Image Processing and Computer Graphics.
 - c) Write a brief note on basic 2D transformations.
 - d) What is meant by Shear? Write transformation matrix of two common Shearing transformations.
 - e) Differentiate between Window and Viewport.
 - f) What is Clipping? What is the need of Clipping?
 - g) Briefly explain about Quadric Surfaces.
 - h) Write a short note on Light sources.
 - i) Define Viewing pipeline and View Volume.
 - j) Define Animation and what the steps for animation sequence are.

PART - B

Answer **FIVE** questions, choosing **ONE** question from each Unit. Each question carries **10** marks. **(5×10=50)**

UNIT-I

2. Write a detailed note on Video display devices.

(OR)

3. With explanation write the Bresenham's Line Drawing algorithm.

UNIT-II

4. Explain about Boundary fill and flood fill algorithms.

(OR)

5. Describe the transformation sequence for rotating an object about a specified pivot point and also write the Composite transformation matrix.

UNIT-III

6. Write a detailed note on Two dimensional viewing transformation pipeline.

(OR)

7. Explain Cohen-Sutherland Line Clipping in details with illustrations.

UNIT-IV

8. Elaborate on Hermite Bezier and B-Spline curves.

(OR)

9. Describe about Polygon rendering methods.

UNIT-V

10. Explain in detail about general three dimensional rotations.

(OR)

11. Write a detailed note on Key frame systems.