Dezyne École College

Bachelor of Computer Application (B.C.A.) Third Year-5th Semester

Computer Graphics

Part-A: Short Answer Questions (2 Marks Each)

(Answer in approx. **50 words**)

1. Define interactive graphics.
2. What is passive graphics? Give one example.
3. Mention two advantages of interactive graphics.
4. Write any two applications of computer graphics.
5. Define a pixel.
6. Write the principle of DDA line drawing algorithm.
7. State the difference between DDA and Bresenham's algorithm.
8. What is the input and output of a circle generation algorithm?
9. Define clipping.
10. What is Cohen-Sutherland line clipping?
11. What is a spline curve?
12. Define affine transformation.
13. Write the matrix form of 2D translation.
14. State the difference between scaling and rotation.
15. What is general pivot-point rotation?
16. Write matrix representation of reflection about x-axis.
17. Define parallel projection.
18. What is the difference between parallel and perspective projection?
19. Write a use case for 3D scaling.
20. What is shear transformation?

Part-B: Long Answer Questions (10 Marks Each)

(Answer in approx. **400 words**)

Unit I: Interactive Graphics, Algorithms & Clipping

1. Explain the classification of computer graphics applications.
2. Compare interactive and passive graphics with examples.
3. Describe the DDA algorithm with step-by-step calculation and example.
4. Explain Bresenham's line drawing algorithm with a numerical example.
5. Describe the midpoint circle generation algorithm with a flowchart and example.
6. What are polynomial and spline curves? Explain their significance in graphics.
7. Define clipping. Explain point and line clipping techniques.
8. Describe the Cohen-Sutherland line clipping algorithm with region codes and example.
9. Write a program in C/C++/pseudo-code to implement the DDA algorithm.
10. Explain the working of a line drawing algorithm and its efficiency considerations.

Unit II: 2D Transformation and Affine Geometry

11. What are 2D transformations? Describe translation, rotation, and scaling with matrix form.
12. Explain general pivot-point rotation and general fixed-point scaling.
13. Describe composite transformations with an example and diagram.
14. Discuss shear transformation with matrix and graphical representation.
15. What are affine transformations? Explain their matrix representation and applications.
16. Derive the matrix for reflection about origin, x-axis, and y-axis.
17. Explain how matrix representation simplifies multiple transformations.
18. Apply a sequence of 2D transformations to a square and show its result.
19. Differentiate between uniform and differential scaling with examples.
20. What is the role of homogeneous coordinates in 2D transformations?

Unit III: 3D Transformations and Projection Techniques

21. Explain parallel projection with its matrix form.
22. Define perspective projection. Explain one-point and two-point perspective with examples.
23. Compare parallel and perspective projection with diagrams.
24. What are the various 3D transformations? Describe them with matrix forms.
25. Explain 3D rotation about arbitrary axes with appropriate matrices.

26. What is 3D scaling? How is it different from 2D scaling?
27. Write the matrix for 3D composite transformation. Give one example.
28. Discuss the difference between orthographic and perspective projections.
29. Explain how 3D transformations are applied to a cube model.
30. Describe the transformation pipeline for 3D graphics rendering.