5th Semester Regular/Back Examination: 2023-24
SUBJECT: Computer Graphics
BRANCH(S): CSE, CSEAIME, CSIT, CST, IT
Time: 3 Hour
Max Marks: 100
Q.Code : N288

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1   Answer the following questions: (2 x 10)
   a)   What is interactive computer graphics?
   b)   List two polygon filling methods.
   c)   What are the raster and vector graphics?
   d)   Define clipping and clip window.
   e)   What are the advantages of B-spline over Bezier curve?
   f)   What is dithering?
   g)   How will you represent a curve in graphics?
   h)   What is translation?
   i)   State the concept of vanishing point.
   j)   How CMY is converted to RGB?

Part-II

Q2   Only Focused-Short Answer Type Questions- (Answer Any Eight out of   (6 × 8)
         Twelve)
   a)   Rotate a triangle placed at A (0, 0), B (1, 1) and C (5, 2) by an angle 45 with
        respect to point P (−1, −1).
   b)   Explain back-face removal algorithm for hidden surface elimination.
   c)   Explain what do you mean by dithering? How is it overcome?
   d)   Difference between DDA and Bresenham's line drawing algorithm.
   e)   What is the use of ray tracing methods? Describe basic ray tracing algorithm in
        detail.
   f)   Differentiate between parallel projections from perspective projection.
   g)   Explain the working principle of Gouraud surface rendering algorithm.
   h)   What are the ways to shade the polygons? Elaborate.
   i)   What is object space and image space approaches for hidden surface removal?
   j)   What is the use of ray tracing methods? Describe basic ray tracing algorithm in
        detail.

k) In what scenarios would you choose to use a perspective projection instead of an orthographic projection? How do they differ in terms of the final image output in 3D graphics?

l) Given a triangle with corner coordinates (0, 0), (1, 0) and (1, 1). Rotate the triangle by 90 degree anticlockwise direction and find out the new coordinates.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Explain the methods involving 2D transformation in computer graphics. Solve the following two numerical. **(8x2)**

a) Given a circle C with radius 10 and center coordinates (1, 4). Apply the translation with distance 5 towards X axis and 1 towards Y axis. Obtain the new coordinates of C without changing its radius.

b) Given a square with coordinate points A (0, 3), B (3, 3), C (3, 0), D (0, 0). Apply the translation with distance 1 towards X axis and 1 towards Y axis. Obtain the new coordinates of the square.

Q4 What is Bezier curve? Write the basic equations for generating Bezier curve. Discuss its properties. Derive Bezier matrix for cubic Bezier curve. **(16)**

Q5 Why illumination models are used? Explain the various kinds of illumination models. **(16)**

Q6 Write short notes on the followings: **(4x4)**
  a. Applications of computer graphics
  b. Window-to-viewport transformation
  c. Composite transformation
  d. CMY color model