9. (a) What is Parallel and Perspective Projections ? Derive a transformation matrix for perspective projection. Consider plane XY as a viewing plane. 7

(b) Derive a transformation matrix for 3D rotation about an arbitrary axis. 7

OR

10. (a) What is the use of Normalized Device Co-ordinates ? Explain with suitable example. 6

(b) Explain Z-buffer and Painter's Hidden surface removal algorithms. Also illustrate the tests performed for Painter's Algorithm. 8

11. (a) Cubic Bezier Curve is described by four control points as $P_0(0, 0)$ $P_1(1, 2)$ $P_2(3, 3)$ and $P_3(4, 0)$. Determine total 6 points on the curve using standard equations. 6

(b) Determine the Blending Function for uniform periodic B-Spline Curve for $d = 3$ and $n = 3$. 7

OR

12. (a) Write short note on Phong and Gouraud shading techniques. 6

(b) Define Polygon mesh. 3

(c) Explain Ray-Tracing algorithm. 4

NTK/KW/15/7440

Faculty of Engineering and Technology

Fifth Semester B.E. (Computer Science Engg.)
(C.B.S.) Examination

COMPUTER GRAPHICS

Time : Three Hours] [Maximum Marks : 80

INSTRUCTIONS TO CANDIDATES

(1) All questions carry marks as indicated.

(2) Solve **SIX** questions as follows :

Que. No. **1 OR** Que. No. **2**

Que. No. **3 OR** Que. No. **4**

Que. No. **5 OR** Que. No. **6**

Que. No. **7 OR** Que. No. **8**

Que. No. **9 OR** Que. No. **10**

Que. No. **11 OR** Que. No. **12**

(3) Due credit will be given to neatness and adequate dimensions.

(4) Illustrate the answers with necessary figures/drawings wherever necessary.

(5) Assume suitable data wherever necessary.

1. (a) Give various applications of Computer Graphics. 6

   (b) Explain difference between Raster and Random Scan Display. 7

OR

2. (a) Explain Hard-Copy technology in Computer Graphics. 7

   (b) Write short note on Graphics Pipeline. 6

3. (a) What is the significance of error term ? Rasterise a line from (0, 0) to (8, –4) using Generalised Bresenham's Algorithm. 6

   (b) A polygon is defined by vertices P_1 (1, 1) P_2 (3, 3) P_3 (5, 3) P_4 (7, 1) P_5 (7, 7) P_6 (5, 5) P_7 (3, 5) P_8 (1, 7). Fill this polygon by using :

      (a) Edge Fill and

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OR

4. (a) Write BRESENHAM'S Algorithm for drawing Circle in First Quadrant Clockwise Direction. 7

   (b) Explain Seed Fill Algorithm. Fill the polygon defined by vertices P_1 (1, 1) P_2 (8, 1) P_3 (8, 4) P_4 (6, 6) P_5 (1, 6) using Simple Seed Fill Algorithm. Also show the content of the STACK. Consider Seed Pixel at (4, 3). 7

5. (a) Explain Operations and Abstraction in OPEN GL. 6

   (b) Write an OPEN GL Program to draw a Rectangle and Square. 7

OR

6. (a) Write short note on 3D Viewing Pipeline. 7

   (b) Explain Animation in OPEN GL. 6

7. (a) A polygon window is defined by vertices A(1, 1) B(5, 2) C(9, 1) D(5, 5). Clip a line from P_1 (1, 2) and P_2 (9, 4) about the given window using Cyrus-Beck Algorithm. 7

   (b) A mirror is placed at y = 3x + 10 line. Find the reflection of a triangle defined by the vertices A(1, 1) B(6, 1) C(3, 5). 6

OR

8. (a) Explain in detail Sutherland-Hodgman polygon clipping algorithm. 6

   (b) Convert a unit square defined by Vertices A(0, 0) B(1, 0) C(1, 1) D(0, 1) into parallelogram using Shearing transformation. 3

   (c) Show that the rotation about origin by 270 degree is equivalent to Reflection about 2 standard axes. 4

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