Roll Number: _____

Thapar Institute of Engineering & Technology, Patiala

Computer Science & Engineering Department

MID SEMESTER EXAMINATION

B. E. (3rd Year)

Course Code: UCS505

Course Name: Computer Graphics

Date: 30th Mar 2022

Timing: 08:00 AM – 10:00 AM

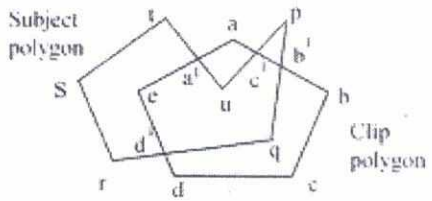
Time: 2 Hours, M. Marks: 35

Faculty: ANG, SHM, AMR, KUC, HAS

1. (a) Write down the differences between Random Scan and Raster Scan display. (3)
   (b) Consider two raster systems with the resolutions of m x n and p x q having m>p and n>q. Both the raster system has refresh rate k frames/second. Calculate the access rate of both the raster systems. What conclusion can you draw about both of these raster systems in terms of per pixel access time? What will be the effect in per pixel access time if resolutions are same but refresh rate is k frames/second for one and 2k frames/second for another? (4)

2. Derive the formulas for Bresenham's circle drawing algorithm. Also, find the pixel points to be drawn using the derived formulas for a circle centered at (50, 30) and having radius of 12. (7)

3. Explain the working of Weiler Atherton polygon clipping algorithm. In the following figure draw the shape of the clipped polygon along with vertices after Weiler Atherton algorithm is used to clip the subject polygon starting with vertex *s*. What will be the clipped output after the application of Sutherland Hodgeman Clipping Algorithm. (7)



4. (a) Prove that window to view port transformation is scaling about fix point followed by translation. (4)

   (b) Find the Normalization transformation matrix window to viewport with window lower left corner at (1,1) and upper right corner at (3,5) onto a viewport with lower left corner at (0,0) and upper right corner at (0.5, 0.5)? (3)

5. (a) There is a rectangular clipping window with x min = 2, y min = 3 and x max = 10, y max = 9. There is a line AB with A (7, 7) and B (9, 10). You need to find the end points after clipping the line AB with Liang Barsky algorithm. How many iterations are there in the worst case scenario of Cohen- Sutherland algorithm during clipping of a line? (4)

(b) Explain the techniques for the color CRT monitors in detail. (3)

6. There is a diamond shaped polygon having vertices A(-1,0), B(0,-2), C(1,0) and D(0,2). Reflect this polygon about the line y=x+3. (7)

7. Devise 8-connected boundary fill algorithm for filling the interior regions with the given input set of vertices having seed pixel (2,3). (7)

Vertex	1	2	3	4	5	6	7	8	9	10	11	12	13
X	1	1	2	2	5	5	7	7	5	5	3	3	1
Y	1	5	5	7	7	5	5	1	1	2	2	1	1