

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
SEVENTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), DECEMBER 2019

**Course Code: CS401**  
**Course Name: COMPUTER GRAPHICS**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions, each carries 4 marks.*

Marks

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| 1  | Suppose you have a raster system designed using an 8 inches × 10 inches screen with a resolution of 100 pixels per inch in each direction. What frame buffer size is required if 6 bits are stored per pixel in the buffer? | (4) |
| 2  | Write the midpoint circle drawing algorithm.  | (4) |
| 3  | a) List the advantages of using Bresenham's line drawing algorithm.   | (2) |
|    | b) What is the purpose of a frame buffer in a display system?   | (2) |
| 4  | How does Cohen Sutherland algorithm determine whether a line is visible, invisible or a candidate for clipping based on the region codes assigned to the end points of the line?  | (4) |
| 5  | A triangle ABC with coordinates A(0,0), B(6,5), C(6,0) is scaled with scaling factors $S_x=2$ and $S_y=3$ about the vertex C(6,0). Find the transformed coordinate points.  | (4) |
| 6  | Write the 3D translation matrix for moving an object by -2 units, -4 units and -6 units respectively in x, y and z directions.  | (4) |
| 7  | Describe Histogram and also the type of information which obtained from a gray level histogram  | (4) |
| 8  | Briefly describe the various classification of the visible-surface detection algorithms.  | (4) |
| 9  | Is there any point at which a set of projected parallel lines appears to converge? Justify your answer.   | (4) |
| 10 | What is edge detection? Explain any one edge detection technique in digital image processing.   | (4) |

**PART B**

*Answer any two full questions, each carries 9 marks.*

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| 11 | a) Describe in detail about emissive and non-emissive flat panel displays. | (5) |
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- b) Explain the working principle of a Refresh CRT monitor with suitable diagrams. (4)
- 12 a) Write the boundary fill algorithm for filling a polygon using eight connected approach. (4)
- b) Use mid-point circle drawing algorithm to plot a circle whose radius =20 units and centre at (50,30). (5)
- 13 a) Write a note on any two interactive graphics input devices. (3)
- b) Scan convert the line segment with end points (30,20) and (15,10) using DDA line drawing algorithm (4)
- c) What are the advantages and disadvantages of DDA line drawing algorithm (2)

### PART C

*Answer any two full questions, each carries 9 marks.*

- 14 a) Perform a 45 degree rotation of a triangle ABC having the vertices at A(0,0) B(10,10) and C(50,20) (6)
- i. About the origin
- ii. About an arbitrary point P(-10,-10)
- b) Describe the tables used to represent a polygon surface. (3)
- 15 a) Explain the window to viewport coordinate transformation and also derive the scaling factors during the transformation. (5)
- b) Show that the composition of two rotation is additive by concatenating the matrix representation for  $R(\Theta_1)$  and  $R(\Theta_2)$  (4)
- 16 a) Show that transformation matrix for a reflection about the line  $y=x$  is equivalent to a reflection relative to the x axis followed by a counter clockwise rotation of 90 degree. (4)
- b) Write Weiler – Atherton polygon clipping algorithm with suitable example. (5)

### PART D

*Answer any two full questions, each carries 12 marks.*

- 17 a) Compare object space and image space method of visible surface detection technique. (3)
- b) Describe in detail the depth buffer visible surface detection technique. Derive the equation to find the depth values for a surface position (x, y). (9)
- 18 a) What is mean by convolution? Give applications of 2D convolution in the field of image processing. (4)
- b) Distinguish between cavalier and cabinet projection. (4)
- c) Explain scan line algorithm with suitable example. (4)

- 19 a) What is parallel projection? Describe orthographic and oblique parallel projection in detail. (6)
- b) Consider the image segment shown below. (6)

3	1	2	<u>1</u>	(q)
2	2	0	2	
1	2	1	1	
(p)	<u>1</u>	0	1	2

- i) Compute the lengths of shortest 4, shortest 8 and shortest m paths between pixels p and q where  $V=\{0,1\}$ . If a particular path does not exist between these two points, explain why.

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