Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – December 2025

Date: 08-12- 2025 **Time:** 01:00pm – 04:00pm

School: SOCSE	**Program:** B.Tech (COM/CEI)	
Course Code: CSE2066	**Course Name:** Computer Graphics	
Semester: V	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Marks	**26**	**22**	**26**	**26**	

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks. 10Q x 2M=20M

1.	**State** the differences between interactive graphics and non-interactive graphics, focusing on user interaction and control over the content.	**2 Marks**	**L1**	**CO1**
2.	**Define** the role of the electron gun in the operation of a Cathode Ray Tube (CRT).	**2 Marks**	**L1**	**CO1**
3.	Define refresh buffer/frame buffer.	**2 Marks**	**L1**	**CO1**
4.	Define 2D translation, rotation, and scaling with equations	**2 Marks**	**L1**	**CO2**
5.	Define vanishing point.	**2 Marks**	**L1**	**CO3**
6.	Recall 3D rotation Z axis matrix.	**2 Marks**	**L1**	**CO3**
7.	Write equations for Composite 3D Translations, rotation	**2 Marks**	**L1**	**CO3**
8.	Define quadric surfaces.	**2 Marks**	**L1**	**CO4**
9.	List the various parametric and geometric continuity of curves.	**2 Marks**	**L1**	**CO4**
10.	**Identify** the mathematical representation of a Bezier curve and **list** the role of control points in shaping the curve.	**2 Marks**	**L1**	**CO4**

Part B

Answer the Questions. **Total Marks 80M**

<table>
<tr><td>11.</td><td>a.</td><td>Explain various steps involved in DDA line drawing algorithm and Bresenham’s line drawing algorithm.</td><td>10 Marks</td><td>L2</td><td>CO1</td></tr>
<tr><td></td><td>b.</td><td>Given the center point coordinates (-2,2) and radius of 6 units, generate all the points to form a circle using Bresenham's circle drawing algorithm in detail with the algorithm steps. Write the points on the circle in all four quadrants.</td><td>10 Marks</td><td>L2</td><td>CO1</td></tr>
<tr><td colspan="6">Or</td></tr>
<tr><td>12.</td><td>a.</td><td>Describe the Digital Differential Analyzer (DDA) algorithm in detailed steps. Using the same algorithm, draw a line from (1, 1) to (13,7). Perform all intermediate calculations, including slope determination, increment values, and rounding operations. Finally, list all the pixel coordinates plotted. Discuss the limitations of the DDA algorithm observed in this example.</td><td>10 Marks</td><td>L2</td><td>CO1</td></tr>
<tr><td></td><td>b.</td><td>Classify the different type of printers and Illustrate cathode Ray tube with neat sketch.</td><td>10 Marks</td><td>L2</td><td>CO1</td></tr>
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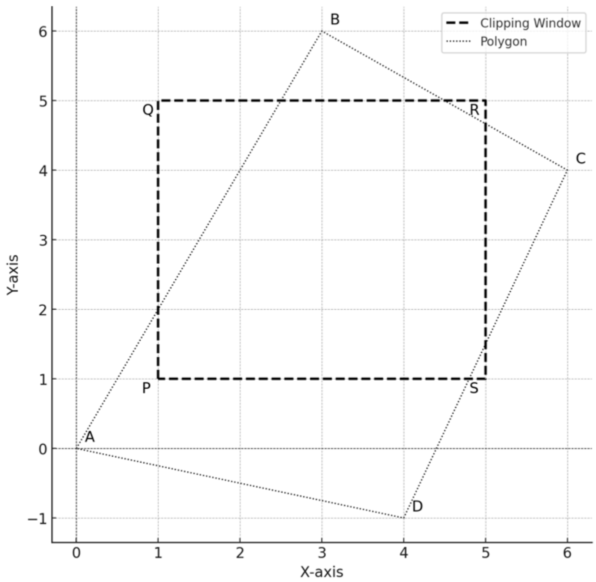
<table>
<tr><td>13.</td><td>a.</td><td>Explain why rotating a 2D object around a general pivot point requires a combination of translation and rotation transformations. Describe the sequence of operations involved with neat diagrams with the corresponding matrices.</td><td>10 Marks</td><td>L2</td><td>CO2</td></tr>
<tr><td></td><td>b.</td><td>Using the Sutherland-Hodgman polygon clipping algorithm, clip the polygon with vertices A,B,C,D against the rectangular clipping window defined by corners P,Q,R,S. Determine the final clipped polygon vertices and explain the step-by-step process of the algorithm.


</td><td>10 Marks</td><td>L2</td><td>CO2</td></tr>
<tr><td colspan="6">Or</td></tr>
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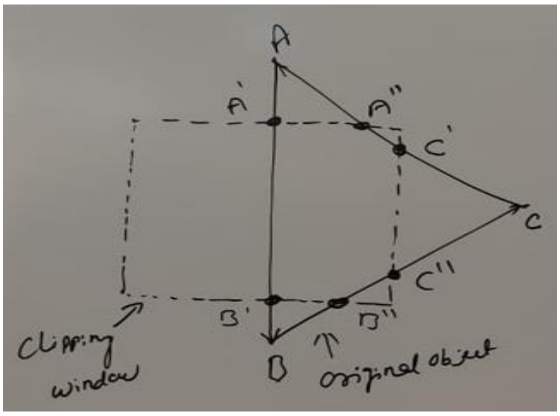
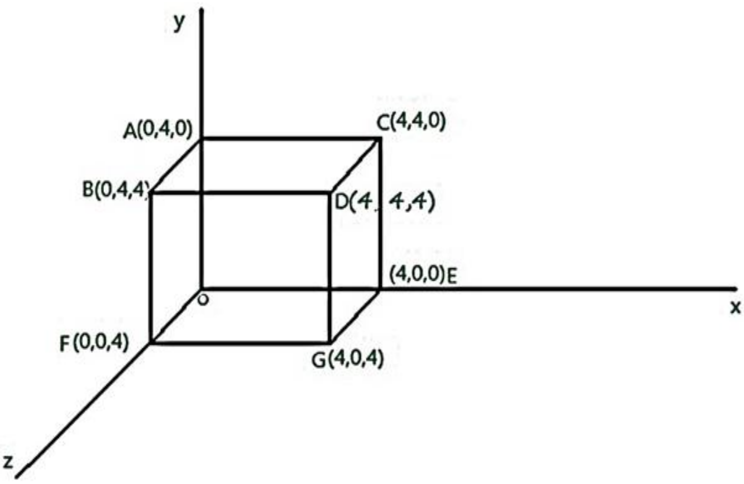
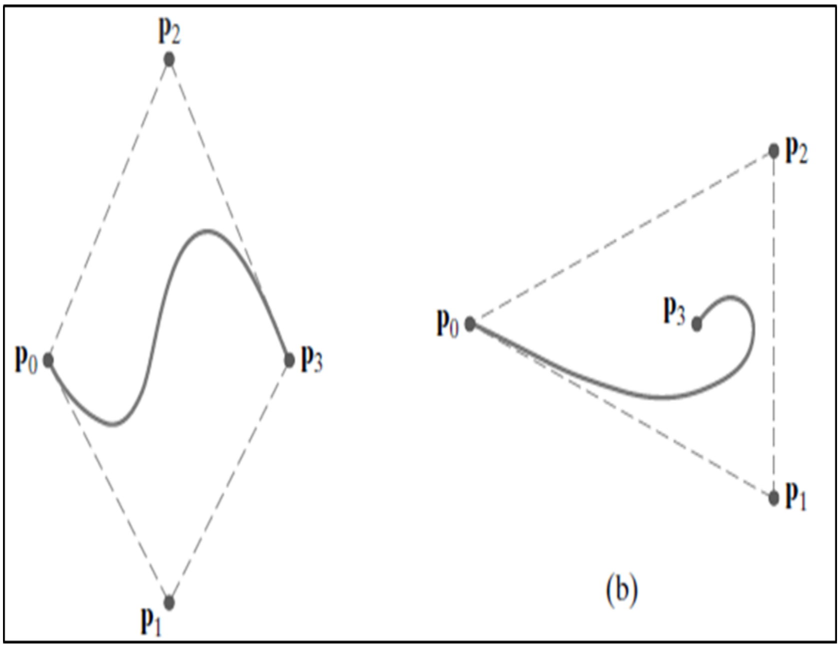
14.	**a.**	Explain Cohen-Sutherland Line clipping Algorithm. Apply the Cohen Sutherland line clipping algorithm to clip the line segment coordinate (30,60) and (60,25) against the window whose coordinates are (Xwmin,Ywmin)=(10,10) and (xwmax,ywmax)=(50,50).	**10 Marks**	**L2**	**CO2**
	b.	Explain the four cases of Sutherland-Hodgman polygon clipping. For a polygon and clipping window shown in Figure 1, compute the list of vertices after each boundary clipping.  **Figure. 1**	**10 Marks**	**L2**	**CO2**
15.	**a.**	(i)Perform 3D translation transformation on the following Figure 2 where the given translation distances are $t_x = 2$, $t_y = 4$, $t_z = 6$ and obtain the new coordinates of the object.  Figure 2 (ii)Perform 3D rotation transformation over a cube 'OABCDEFG' as shown in Figure 2 and rotate it through 45^0 in the anticlockwise direction about the y-axis and obtain the new coordinates of the object. (iii)Consider where a cube" OABCDEFG" is given O(0, 0, 0,), A(0, 4, 0), B(0, 4, 4), C(4, 4, 0), D(4, 4, 4), E(4, 0, 0), F(0, 0, 4), G (4, 0, 4) and Scaling factor Sx,=2 Sy=3, Sz=2. Apply Scaling	**10 Marks**	**L2**	**CO3**

		operation over the cube for the above Figure 2 and obtain the new coordinates of the object.			
	b.	Explain different types of Axonometric Projections	**10 Marks**	**L2**	**CO3**
		Or			
16.	**a.**	Explain different types of Perspective Projections?	**10 Marks**	**L2**	**CO3**
	b.	A 3D object is defined by the vertices A(1,2,3), B(4,5,6), C(7,8,9) and D(2,4,6). Perform the following transformations sequentially and find the final coordinates of the vertices: 1. Translate the object by T(3,−2,1), then , 2. Scale the object with factors S(2,1,0.5), then, 3. Rotate the object 90° clockwise about the Z-axis. Show all intermediate steps, including the transformation matrices used, and provide the final coordinates of the transformed object.	**10 Marks**	**L2**	**CO3**

17.	**a.**	Illustrate the non-parametric and parametric representation of curve, circle, ellipse, parabola and hyperbola with appropriate diagram.	**20 Marks**	**L2**	**CO4**
		Or			
18.	**a.**	Explain Bezier and Spline curves for curve representations in computer graphics with suitable diagrams.  Convex-hull shapes (dashed lines) for two sets of control points in the x y plane. Control-graph shapes (dashed lines) for two sets of control points in the x y plane.	**20 Marks**	**L2**	**CO4**