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## End Semester Examination 2024

Name of the Course: MCA

Semester: IV

Name of the Paper : Graphics and Visual Computing

Paper Code: TMC 401

Time: 3 Hour's

Maximum Marks: 100

**Note:**

- (i) All Questions are compulsory.
- (ii) Answer any two sub questions among a,b and c in each main question.
- (iii) Total marks in each main question are twenty.
- (iv) Each question carries 10 marks.

<b>Q1</b>	<b>(10 X2 = 20 Marks)</b>	<b>CO1</b>
(a)	Write down and Explain the Mid point circle drawing algorithm. Assume 10cm as the radius and origin as the centre of the circle.	
(b)	Discuss the difference between Boundary fill and flood fill algorithm.	
(c)	Perform a 45 degree rotation of a triangle A(0,0), B(1,1) and C(5,2) about origin.	<b>CO2</b>
<b>Q2</b>	<b>(10 X2 = 20 Marks)</b>	
(a)	What is Polygon? Also explain the polygon clipping and define the Sutherland Hodgeman Polygon clipping algorithm in detail.	
(b)	What do you mean by Projection? Differentiate between Parallel and Perspective projection in detail.	<b>CO3</b>
(c)	Suppose we have a cube defined by its vertices in 3D space: Vertex A: (1, 1, 1) Vertex B: (-1, 1, 1) Vertex C: (-1, -1, 1) Vertex D: (1, -1, 1) Vertex E: (1, 1, -1) Vertex F: (-1, 1, -1) Vertex G: (-1, -1, -1) Vertex H: (1, -1, -1) Perform the following transformation: <ul style="list-style-type: none"> <li>Translate the cube by (2,3,-4) along x, y and z-axis respectively.</li> <li>Rotate the cube by 45 degree around y-axis about origin.</li> <li>Scale the cube by a factor of 2 along the x-axis, 0.5 along the y-axis, and 1.5 along the z-axis.</li> </ul>	
<b>Q3</b>	<b>(10 X2 = 20 Marks)</b>	
(a)	Consider a quadratic Bezier curve defined by three control points: $P_0=(0,0), P_1=(2,4), P_2=(4,0)$ . Calculate the points on the curve for various values of $t$ ranging from 0 to 1.	<b>CO4</b>
(b)	What is a B-spline curve, and how does it differ from Bezier curves? Explain the concept of basis functions in the context of B-spline curves.	
(c)	Describe the steps involved in displaying a B-spline curve in a computer graphics environment. Include the process of evaluating points on the curve, rendering the curve, and any considerations for displaying it effectively.	
<b>Q4</b>	<b>(10 X2 = 20 Marks)</b>	<b>CO4</b>
(a)	What is rendering in computer graphics? What are the main steps involved in the rendering process?	
(b)	What are homogeneous coordinates, and how are they used in affine transformations?	

(c)	Write short notes on: <ul style="list-style-type: none"> <li>• Depth Buffering</li> <li>• Painter's Algorithm</li> </ul>	
Q5	(10 X2 = 20 Marks)	
(a)	What are the fundamental differences between 2D and 3D visualization in computer graphics?	CO5
(b)	How would you visualize categorical data in a way that effectively communicates the distribution of different categories? Describe the most suitable visualization techniques for representing temporal data over a period of time.	
(c)	Explain how we can evaluate the different visualization methods. Also discuss the application of visualization.	