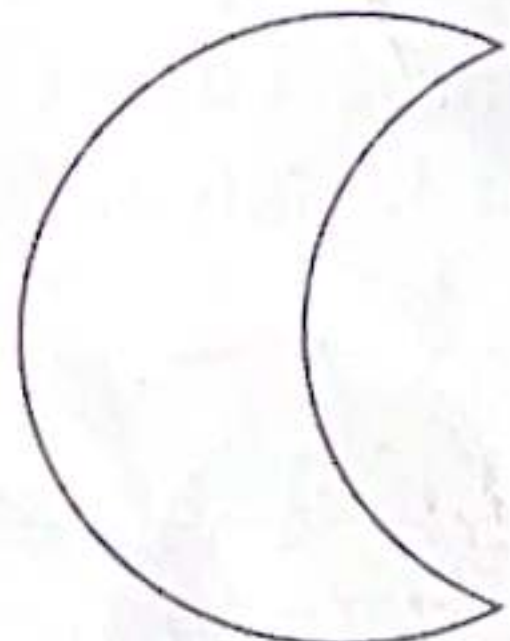


Time: 01:30 Hrs

Answer ALL Questions

1.	a) A CAD application renders thin diagonal edges of mechanical parts on a raster display. When zoomed out, the edges appear visually acceptable, but during zoom-in and rotation operations, strong jagged artifacts and moiré-like patterns become visible. To address this issue, the system designers consider three solutions: uniformly increasing the rendering resolution, computing pixel intensities based on the exact area of overlap between the edge and each pixel, and rendering the scene on a dense virtual sampling grid followed by low-pass filtering before final display. From this scenario, identify the anti-aliasing technique represented by each solution and explain the working principles of any two of them.	[5]	CO1
	b) Explain the derivation of the 2D rotation transformation matrix for rotating a point about the origin by an angle θ.	[3]	
2.	Suppose we want to draw a V-shaped figure on a raster display. For this purpose, we have taken three points: A (38, 45), B (40, 40), and C (42, 45). The V-shape is formed by joining the line segments AB and BC. The graph shows a V-shaped figure on a raster display. The X-axis ranges from 36 to 44, and the Y-axis ranges from 37 to 47. Three points are plotted: A(38, 45), B(40, 40), and C(42, 45). Line segments AB and BC are drawn, forming the V-shape. Apply Bresenham's Line Drawing Algorithm to determine the corresponding pixel points and draw the line segments AB and BC of the V-shaped figure.	[7]	CO2

3.	Suppose we want to draw a lens-shaped figure using a raster display. For this purpose, we have taken two circles of equal radius 10 units, centered at $(6, 0)$ and $(-6, 0)$, respectively. We have trimmed the inner overlapping portions of both circles so that only the outer arcs remain, forming a shape similar to the given figure. Now, analyze the Midpoint Circle Drawing Algorithm to determine the pixel points of the required arcs and plot the tentative shape. 	[7]	CO2
4.	Consider a 3D shape with initial coordinates $A(-2,3,-1)$, $B(1,3,-1)$, and $C(1,-2,3)$. After applying a rotation of θ degrees about the X-axis, the new coordinates become $A'(-2,3,-1)$, $B'(1,3,-1)$, and $C'(1,-2,3)$. Using the X-axis rotation transformation matrix, analyze the transformation and discover the value of the rotation angle θ.	[3]	CO2