Question Paper

Exam Date & Time: 13-Jul-2022 (09:00 AM - 12:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

SIXTH SEMESTER B.TECH END SEMESTER MAKEUP EXAMINATIONS, JULY 2022

COMPUTER GRAPHICS [ICT 4033]

Marks: 50 **Duration: 180 mins.**

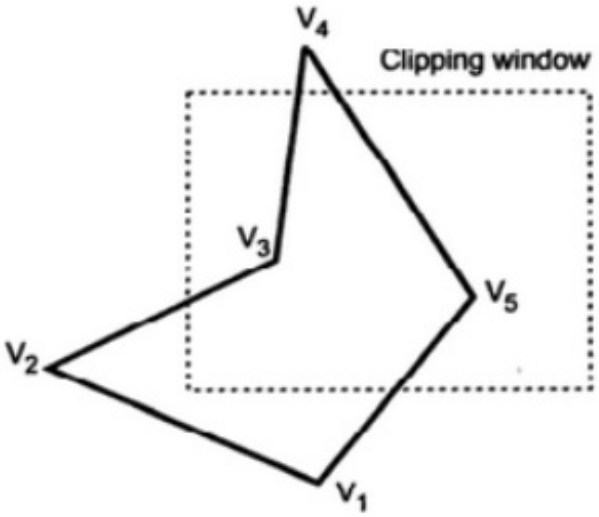
A

Answer all the questions.

Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed

1) Develop a step-by-step procedure of the Sutherland-Hodgeman polygon clipping algorithm. Illustrate the working of this algorithm for the polygon and the clipping window as shown. (5)

A)



B) Given a 3D triangle with points (0, 0, 0), (1, 1, 2) and (1, 1, 3). Apply shear parameter 2 on X axis, 2 on Y axis and 3 on Z axis and find out the new coordinates of the object. (3)

C) "Random scan monitors are referred to as vector display", justify this statement (2)

2) Find the clipping coordinates for a line R_1R_2 where $R_{1=}$(40, 15) and R_2=(75, 45), against clipping window with (X_{wmin}, Y_{wmin})=(50, 40) and (X_{wmax}, Y_{wmax})=(80, 10). Use the Liang- Barsky algorithm to clip the line and find the intersection point. Show all intermediate steps. (5)

A)

B) Find the normalization transformation window to viewport, with window lower left corner at (2,3) and upper right corner at (4,7) onto a view port, for entire normalized device screen. (3)

C) Given a 3D triangle with coordinate points A(3, 4, 1), B(6, 4, 2), C(5, 6, 3). Apply the reflection on the XZ plane and find out the new coordinates of the object. (2)

3) Given the centre point coordinates (4, 4) and radius as 10, generate all the points to form a circle using Mid-Point Circle Drawing Algorithm. Show all intermediate steps. (5)

A)

	B)	Given a 2D triangle with coordinate points P(3, 6), Q(4, 8), R(6,11) and answer the following questions. i. Apply shear parameter 4 on X axis and 3 on Y axis and find out the new coordinates of the object. ii. Perform a clockwise 30 degree rotation on the above mentioned triangle about the point (3,3).	(3)
	C)	Compare refresh type and storage type CRT (Cathode Ray Tube) display.	(2)
4)		Determine the content of the active edge table to fill the polygon with vertices	(5)
	A)	A(2,4) B(2,7) , C(4,9) and D(4,6).	
	B)	Given a 3D object with coordinate points A(0, 3, 3), B(3, 3, 6), C(3, 0, 1), D(0, 0, 0). Apply the scaling parameter 2 towards X axis, 3 towards Y axis and 3 towards Z axis and obtain the new coordinates of the object.	(3)
	C)	Given a 3D object with coordinate points K(0, 3, 1), L(3, 3, 2), M(3, 0, 0), N(0, 0, 0). Apply the translation with the distance 3 towards X axis, 2 towards Y axis and 4 towards Z axis and obtain the new coordinates of the object.	(2)
5)		Consider the line from (4,6) to (12, 13) and use the Bresenham's Line Drawing algorithm to rasterize this line. Show all intermediate steps.	(5)
	A)		
	B)	Given a line segment with starting point as (0, 0) and ending point as (4, 4). Apply 30 degree rotation anticlockwise direction on the line segment and find out the new coordinates of the line.	(3)
	C)	Calculate the points between the starting coordinates (5, 9) and ending coordinates (12, 16) using Mid-Point Line Drawing Algorithm.	(2)

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