B.E. Sixth Semester (Computer Technology) (C.B.S.)

Computer Graphics

P. Pages : 3 **KNT/KW/16/7401**

Time : Three Hours * 0 1 2 9 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Define computer graphics? Explain its various applications in detail. **7**

b) Describe in brief about following **6**

I) Interlacing

II) Display processor

OR

2. a) Explain in detail about Graphics pipeline. **7**

b) Describe in brief about following: **6**

I) Random-scan display processor

II) Vector-scan display processor

3. a) Consider the Polygon defined by vertices **10**
$P_1(1,2)$, $P_2(4,5)$, $P_3(7,2)$, $P_4(7,5)$ $P_5(4,8)$, $P_6(1,5)$.

Then perform polygon filling by following algorithm. Show all the computation.

I) Edge fill Algorithm

II) Edge flag Algorithm

b) Explain in detail about half toning techniques. **4**

OR

4. a) State and explain about simple 4-connected seed fill algorithm for polygon filing. Also perform polygon filling by same algorithm for the polygon whose vertices are defined as follows: **7**

Vertex	A	B	C	D	E
X-coordinate	1	8	8	6	1
Y-coordinate	1	1	4	6	6

Assume seed pixel (4,3).

b) Explain in detail about various antialiasing techniques. Also explain. Aliasing effect. **7**

5. a) Consider a polygon with vertices as follows: **7**

Vertex	V_1	V_2	V_3	V_4	V_5	V_6	V_7	V_8
X-coordinate	1	0	0	1	2	3	3	2
Y-coordinate	0	1	2	3	3	2	1	0

Then perform clipping of a line segment from $P_1(-1,-1)$ to $P_2(3,3)$ to above polygon as window using Cyrus Beck algorithm.

b) Determine the eleven points on a Bezier curve with equidistant parametric values having control points as follows: **7**

(x_0,y_0)	(50,180)
(x_1,y_1)	(250,100)
$(x_2)\ y_2)$	(600,300)
(x_3,y_3)	(500,50)

Assume that all these control points are distributed over a screen of resolution 640 x 350.

OR

6. a) Consider the polygon vertices as P_1 (2,2), P_2(2,7) and P_3(7,2). Also consider the window vertices as W_1(-4,4), W_2(-4,-4), W_3(4,-4) and W_4(4,4). Then perform polygon clipping using Sutherland Hodgman algorithm. **7**

b) A window is defined by coordinates 0,50, 0,50 respectively and line P_1 (-10,40) P_2 (30,-20). Then perform line clipping by midpoint subdivision algorithm. **7**

7. a) Find a normalized transformation that maps a window whose lower left corner is (1,1) and upper right corner is (3,5). **6**

I) A view port that is entire normalized device screen.

II) A view port that has left lower corner at (0,0) and upper right corner at (0.5, 0.5).

b) Find reflection of a triangle whose vertices are defined as follows about a line y = 2x+10. **7**

Vertex	x-coordinate	y-coordinate
A	1	1
B	5	1
C	1	5

OR

8 a) Find the instant transformation which converts figure A into figure B. The vertices for both the figure are defined as follows: **6**

Figure A		Figure B	
Vertex	Co-ordinates	Vertex	Co-ordinates
A_1	(3,2)	B_1	(-3,-1)
A_2	(2,1)	B_2	(-4,-2)
A_3	(4,1)	B_3	(-2,-2)

b) Find the complete viewing transformation that maps a window in word co-ordination x tends from 1 to 10 and y tends from 1 to 10, on to a viewport with x tends from $\frac{1}{4}$ to $\frac{3}{4}$ and y tends from 0 to $\frac{1}{2}$ and then maps a window with x-tends from $\frac{1}{4}$ to $\frac{1}{2}$ and y tends from $\frac{1}{4}$ to $\frac{1}{2}$ is normalized device space into a viewport with x tends from 1 to 10 and y tends from 1 to 10 on physical device. **7**

9. a) Derive a transformation matrix for rotation of an angle about an arbitrary line in 3D plane. **9**

b) Explain in detail about Pointer's Algo. for hidden surface removal. **4**

OR

10. a) Explain in detail about z-buffer algorithm for hidden surface removal. Also give its advantages and disadvantages. **7**

b) Explain in detail about following. **6**
I) Parallel projection. II) Perspective projection.

11. a) Explain various features provided by open GL. **7**

b) Explain in detail about following: **6**
I) GL II) GLU III) GLUT

OR

12. a) Explain about 3D viewing pipeline with respect to open GL. **7**

b) Write a sample program to generate a circle of radius = 10 in open GL. **6**

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