Roll No. ..... Total Pages : 2

BT-6/M-13 **8618**

COMPUTER GRAPHICS

Paper : IT-356

Time : Three Hours] [Maximum Marks : 100

Note : Attempt *five* questions in all selecting at least *one* question from each unit. All questions carry equal marks.

UNIT–I

1. (a) Write an algorithm for Bresenham's Line generation which will work for all slopes. Calculate the pixel positions along a straight line between $P_1(20, 20)$ and $P_2(10, 10)$. (10)

(b) Explain Scan-line algorithm for the filling of polygonal area. (10)

2. Discuss various methods of 2D area filling, and state the relative merits and demerits of each. (20)

UNIT–II

3. Write a line clipping algorithm which uses parametric form of equations. Find the clipping coordinates of the line P_1P_2 where $P_1 = (10, 10)$ and $P_2 = (60, 30)$, against window with $(x_{wmin}, y_{wmin}) = (15, 15)$ and $(x_{wmax}, y_{wmax}) = (25, 25)$. (20)

4. (a) Explain Sutherland-Hodgman Clipping algorithm with example. Also give the limitations of this algorithm. (10)

(b) Suggest modification to Sutherland-Hodgman Polygon clipping algorithm to clip concave. (10)

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UNIT–III

5. (a) Find the transformation of triangle A(1, 0), B(0, 1), C(1, 1) by

(i) Rotating 45° about the origin and then translating 1 unit in x and y direction.

(ii) Translating 1 unit in x and y direction and then rotating 45° about the origin. (10)

(b) Show how shear transformation may be expressed in terms of rotation and scaling. (10)

6. Write a detailed note on different types of parallel projections. Also derive the transformation matrix for general parallel projection on XY-plane and given view plane. (20)

UNIT–IV

7. (a) Explain how area subdivision method is used for hidden surface elimination. What are the advantages of using this algorithm? (10)

(b) Develop a program for the Z-buffer technique. (10)

8. Derive a mathematical representation for Bezier curves and state their properties. If the Bezier curve is to be generated for $P_1(0, 0)$, $P_2(1, 3)$, $P_3(4, 2)$ and $P_4(2, 1)$ using six intervals of parameter u, find out the co-ordinates positions for every value of u. (20)

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