



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.Tech (IT)/SUPPLE/SEM-7/IT-703A/2010**

**2010**

**COMPUTER GRAPHICS**

Time Allotted : 3 Hours

Full Marks : 70

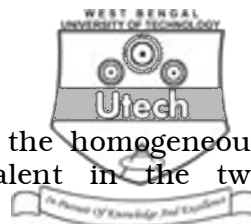
*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words  
as far as practicable.*

**GROUP – A**

**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for the following :  $10 \times 1 = 10$ 
  - i) Bresenham's Algorithm seeks to select the optimum raster location that represents a
    - a) straight line
    - b) polygon
    - c) curve line
    - d) none of these.
  - ii) Tablet is
    - a) physical interactive device
    - b) logical interactive device
    - c) data generation device
    - d) none of these.
  - iii) The slope of the Bezier curve at the start of the curve is controlled by
    - a) 1st control point
    - b) 1st two control points
    - c) 1st three control points
    - d) all four control points.



- iv) If  $(x, y, w)$ ,  $w \neq 0$ , is a point in the homogeneous coordinate system then its equivalent in the two dimensional system is
- a)  $(x, y, 1)$                       b)  $(x, y, 0)$   
c)  $(x/w, y/w)$                   d)  $(x, y, x - y)$ .
- v) Clipping algorithms are
- a) two dimensional  
b) three dimensional  
c) two or three dimensional  
d) none of these.
- vi) The DDA algorithm is faster method for calculating pixel positions than direct use of line equation using  $y = mx + c$
- a) it eliminates floating point addition  
b) it eliminates floating point multiplication  
c) it eliminates rounding operation that drift away from true line path  
d) none of these.
- vii) Aliasing means
- a) Rendering effect              b) Shading effect  
c) Staircase effect                d) Cueing effect.
- viii) Z-buffer algorithm is used for
- a) frame buffer removal      b) hidden line removal  
c) rendering                      d) animation.
- ix) The amount of memory in frame buffer is called
- a) bit plane                        b) plane  
c) bit                                d) none of these.
- x) Under parallel projection the point  $(2, 3, -1)$  has been viewed at  $(3, 3, 0)$ . Then the direction of the vector should be
- a)  $(1, 1, 0)$                       b)  $(1, 0, -1)$   
c)  $(0, 1, 1)$                       d)  $(0, -1, 1)$ .



**GROUP – B**

**( Short Answer Type Questions )**

Answer any *three* of the following.

3 × 5 = 15

2. What are the differences between raster scan and vector scan techniques ?
3. Define projection and mention its importance. Derive the transformation matrix for a perspective projection. 3 + 2
4. Distinguish between window and viewport. Describe window to viewport mapping. 2 + 3
5. Magnify the triangle with vertices A ( 0, 0 ), B ( 2, 2 ) and C ( 6, 8 ) to twice of it while keeping C ( 5, 2 ) fixed.
6. Use the Cohen-Sutherland algorithm to clip two lines P1 ( 40, 15 ) – P2 ( 75, 45 ) and P3 ( 70, 20 ) – P4 ( 100, 10 ) against a window A ( 50, 10 ), B ( 80, 10 ), C ( 80, 40 ) and D ( 50, 40 ).

**GROUP – C**

**( Long Answer Type Questions )**

Answer any *three* questions.

3 × 15 = 45

7. a) Explain Bresenham's line drawing algorithm. Discuss its advantages over DDA.  
b) Find the pixel location approximating the first octant of a circle having centre ( 2, 3 ) and a radius 2 units using Bresenham circle algorithm. 7 + 2 + 6
8. a) Why is a homogeneous co-ordinate system needed in transformation matrix ?  
b) Derive transformation matrix for rotation about any axis.  
c) What do you mean by shearing ?  
d) Explain the reflection of a 2D figure on  $y = mx + c$ . Derive its component matrix. 3 + 3 + 3 + 6



9. a) Discuss briefly about the Cohen-Sutherland line clipping algorithm.
- b) Suppose a window has its lowest left corner at  $(-2, -1)$  and its upper right corner at  $(3, 2)$ . Using Cohen-Sutherland algorithm for the line clipping, find the visible portion of the line joining points  $(-3, 1)$  and  $(4, -1)$ . 7 + 8
10. a) Explain the term “control points”. Give details of how Bezier curves are generated. Write the pseudo-code for generating Bezier curve.
- b) What are the advantages of using B-spline curve over Bezier curve? ( 2 + 5 + 4 ) + 4
11. Write short notes on any *three* of the following : 5 + 5 + 5
- a) DDA algorithm
  - b) Flood fill algorithm
  - c) Functionality of a refresh CRT
  - d) Colour Models
  - e) Z-buffer algorithm.
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