



Name :
Roll No. :
Invigilator's Signature :

CS/B.TECH(IT)/SEP.SUPPLE/SEM-7/IT-703A/2012

2012

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 any *ten* of the following : 10 × 1 = 10
- i) The slope of the cubic Bezier curve at the start of the curve is controlled by
 - a) first control point
 - b) first two control points
 - c) first three control points
 - d) all four control points.
 - ii) A projection in which all three foreshortening factors are kept equal is called
 - a) Isometric projection b) Diametric projection
 - c) Trimetric projection d) none of these.
 - iii) If ($x, y, 0$) is a point in the homogeneous coordinate system then it represents
 - a) origin in 2D coordinate system
 - b) origin in 3D coordinate system
 - c) a point at infinity
 - d) point (x, y) in 2D coordinate system.



- iv) In Bresenham's Circle generation algorithm, if (x, y) is the current pixel position, then the y value of the next pixel position is
 - a) y or $y + 1$
 - b) y alone
 - c) $y + 1$ or $y - 1$
 - d) y or $y - 1$.
- v) In Cohen-Sutherland line clipping algorithm, if the codes of the two points P & Q are 0101 & 0001 then the line segment joining the points P & Q will be the clipping window.
 - a) totally outside
 - b) partially outside
 - c) totally inside
 - d) none of these.
- vi) acts as anode in CRT.
 - a) The phosphorous coating
 - b) The glass panel
 - c) The deflector
 - d) None of these.
- vii) In the inside-outside test of polygon, if the winding number of a point is zero then the point lies the polygon.
 - a) inside
 - b) outside
 - c) on
 - d) as vertex of.
- viii) Sutherland-Hodgman algorithm is used for
 - a) line clipping
 - b) point clipping
 - c) polygon clipping
 - d) hybrid clipping.
- ix) the blending functions of Bezier curves are
 - a) Splines
 - b) Bernstein polynomials
 - c) Lagrangian polynomials
 - d) Newton polynomials.
- x) Z-buffer algorithm is used for
 - a) frame buffer removal
 - b) visible surface detection
 - c) rendering
 - d) animation.



- xi) Refresh rate is
- the rate at which the number of bit planes are accessed at a given time
 - the rate at which the picture is redrawn
 - the frequency at which the aliasing takes place
 - the frequency at which the contents of the frame buffer is sent to the display monitor.
- xii) The Look up table technique the number of intensity levels.
- decreases
 - increases
 - removes
 - gives no effect on.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

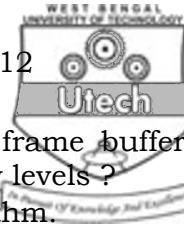
- Using Bresenham's line drawing algorithm, determine successive pixel positions along the line path with end points (20, 10) and (30, 18).
- Describe Bresenham's line generating algorithm.
- Use the Cohen-Sutherland line clipping algorithm to clip two lines with end points $p_1(40,15)$, $p_2(75,45)$ and $p_3(70,20)$, $p_4(100,10)$ respectively; against a rectangular window with vertices A (50, 10), B (80, 10), C (80, 40) and D (50, 40).
- Perform a 45° rotation of triangle A (0,0), B (5, 2) and C (3, 7).
 - about the origin and
 - about P (-1, -1).
- Derive general parallel projection transformation matrix.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

- Why do we prefer incremental line drawing algorithm over DDA line drawing algorithm ?
 - What is homogeneous coordinate ? Why is a homogeneous coordinate system needed in transformation matrix ?



- c) How much memory is needed for the frame buffer to store a 640×400 display having 16 gray levels ?
- d) Describe Mid-point circle drawing algorithm. 2 + 3 + 4 + 6
8. a) Derive the transformation matrix that rotates an object point θ° about the origin.
- b) Explain the reflection of a 2D figure on $y = mx + c$. Derive its transformation matrix.
- c) Magnify the triangle with vertices $A (0,0)$, $B (1, 1)$ and $C (5, 2)$ to twice its size while keeping $C (5, 2)$ fixed. 5 + 5 + 5
9. a) Explain the term 'control points' in the context of curve generation.
- b) Find equation of Bezier curve which passes through points $(0 , 0)$ and $(-2, 1)$ and is controlled through points $(7, 5)$ and $(2, 0)$.
- c) Derive and plot Beizer blending functions for cubic curves $(n = 3)$. 3 + 7 + 5
10. a) Describe Depth-Buffer method of visible surface detection.
- b) The pyramid defined by the coordinates $A (0, 0, 0)$, $B (1, 0, 0)$, $C (0, 1, 0)$ and $D (0, 0, 1)$ is rotated 45° about line L that has the direction $V = J + K$ and passing through point $C (0, 1, 0)$. Find the coordinate of the rotated figure. 5 + 10
11. Write short notes on any *three* of the following : 3 × 5 = 15
- a) Window to view port coordinates transformation
 - b) Gourad Shading
 - c) Phong's Shading model
 - d) CMY colour model
 - e) Boundary fill algorithm
 - f) Painter's algorithm
 - g) Virtual reality.
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