

GURU NANAK INSTITUTE OF TECHNOLOGY
An Autonomous Institute under MAKAUT
2020-2021
COMPUTER GRAPHICS
CS501

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)

Answer any *ten* from the following, choosing the correct alternative of each question: **10×1=10**

Marks CO No.

- | | | | |
|-------|--|----|-----|
| 1. i) | The type of geometric transformation applied to an object for re-positioning it along a straight-line path from one location to another: | | |
| | a) Scaling | 01 | CO3 |
| | b) Rotation | | |
| | c) Translation | | |
| | d) Reflection | | |
| ii) | Graphics with limited features is known as | | |
| | a) Active graphics | | |
| | b) Passive graphics | 01 | CO1 |
| | c) Grayscale image | | |
| | a) None of these | | |
| iii) | The region code of a point is 1001. The point is in the _____ region of window. | | |
| | a) Top right | | |
| | b) Top left | 01 | CO4 |
| | c) Bottom left | | |
| | d) Bottom right | | |
| iv) | The refresh rate below which a picture flicker is | | |
| | a) 25 | | |
| | b) 30 | 01 | CO1 |
| | c) 35 | | |
| | d) 60 | | |
| v) | The rectangle portion of the interface window that defines where the image will actually appear are called | | |
| | a) View port | | |
| | b) Transformation viewing | | |
| | c) Clipping window | 01 | CO3 |
| | d) Screen coordinate system | | |

- vi) _____ is the rigid body transformation that moves object without deformation
- a) Translation
 - b) Scaling
 - c) Rotation
 - d) Shearing
- vii) The method which used either delta x or delta y, whichever is larger, is chosen as one raster unit to draw the line this algorithm is called?
- a) DDA Line Algorithm
 - b) Midpoint Line Algorithm
 - c) Bresenham`s Line Algorithm
 - d) Generalized Bresenham`s Algorithm
- viii) Which technique of color CRT is used for production of realistic image
- a) Shadow mask method
 - b) Beam penetration method
 - c) Both A and B
 - d) None of these
- ix) The parametric representation of the line segment between the position vectors P1(2, 3) and P2(5, 4) is given as
- a) $x(t)= 2+7t, y(t) = 3+7t \quad 0 \leq t \leq \infty$
 - b) $x(t)=2+10t, y(t) = 3+12t \quad 0 \leq t \leq 1$
 - c) $x(t)= 2+3t, y(t)=3+t \quad 0 \leq t \leq 1$
 - d) $t(x, y) = 14t \quad 0 \leq t \leq 1$
- x) CMYK model is used for
- a) Digital Painting
 - b) Printing
 - c) Computer display
 - d) All of these
- xi) In a boundary fill algorithm for filling polygon, boundary defined regions may be either _____ connected or _____ connected.
- a) 2, 4
 - b) 4, 8
 - c) 8, 16
 - d) 8, 6
- xii) The types of hidden surface removal algorithm are
- a) Depth comparison, Z-buffer, back-face removal
 - b) Scan line algorithm, priority algorithm
 - c) BSP method, area subdivision method
 - d) All of these

GROUP – B

(Short Answer Type Questions)
(Answer any *three* of the following)

3 x 5 = 15

		Marks	CO No.
2.	a) What are the disadvantages of DDA line drawing algorithm?	2	CO2
	b) Suppose an RGB raster system is to be designed using an 8inch X 8inch screen with a resolution of 100 pixels per inch in each direction. if we want to store 6 bits per pixel in the frame buffer, how much storage in bytes do we need for the frame buffer? Also find out the aspect ratio of the system.	3	CO1
3.	a) What is seed fill algorithm?	2	CO4
	b) Discuss additive and subtractive colour models with an example for each.	3	CO5
4	Find the equation of the bezier curve which passes through (0,0) and (-4,2) and controlled through (14,10)and (4,0).	5	CO4
5.	a) Why are hidden surface algorithms needed?	1	CO4
	b) What is the maximum number of object that can be handled by Z-buffer algorithm?	2	CO5
	c) Why is it easier to locate hidden surfaces when parallel projection is used?	2	CO4
6.	Derive mid-point circle drawing algorithm.	5	CO2

GROUP – C

(Long Answer Type Questions)
Answer any *three* of the following)

3 x 15 = 45

		Marks	CO No.
7.	a) Derive the Bresenham's Line Drawingalgorithm for slop $m < 1$.	7	CO2
	b) Digitize a line from (10, 12) to (20, 18) using Bresenham's Line Drawing Algorithm.	5	CO2
	c) Differentiate between raster and random scan.	3	CO5
8.	a) Prove that two successive scaling transformations are commutative	5	CO2
	b) Discuss Window to Viewport Coordinate transformation	4	CO3
	c) Use Cohen-Sutherland algorithm to clip a line P1(70,20) and P2(100,10) against a window with lower left corner (50,10) and upper right corner (80,40).	6	CO4
9.	a) Differentiatebetween Flood fill and Boundary fill algorithm.	3	CO4
	b) Write down the function of 8-connected flood fill process.	6	CO4
	c) Explain coherence property in scanline polygon filling.	2	CO4
	d) Distinguish Bezier between curve and B-Spline curve.	4	CO3
10.	a) Derive the transformation matrix for the 2D rotation about an arbitrary point.	5	CO3
	b) Magnify the triangle with vertices A(1,1),B(3,2) and C(7,3)to twice its size, while keeping C(7,3) fixed.	5	CO3
	c) Explain Weiler Atherton polygon clipping algorithm with a suitable example.	3	CO4

- | | | | |
|----|---|--------|-----|
| | d) Why is a homogeneous co-ordinate system needed in transformation matrix? | 2 | CO4 |
| 11 | Write short notes on <i>any three</i> of the following: | 3×5=15 | |
| | a) 3D Projection | | CO3 |
| | b) RGB & CMYK Color Model | | CO5 |
| | c) Anti-Aliasing | | CO1 |
| | d) Viewing Pipeline | | CO4 |
| | e) CRT | | CO2 |