POKHARA UNIVERSITY

Level: Bachelor | Semester: Fall | Year : 2021
Programme: BE | Full Marks: 100
Course: Computer Graphics | Pass Marks: 45
Time : 3hrs.

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

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Define computer graphics. List the application of computer graphics in different fields. 7
   b) In a true color system having resolution of 1024*768 having the refresh rate of 60fps calculate the following 8
      i. Size of frame buffer
      ii. Access time of one frame
      iii. Access time for one pixel
      iv. Access time for one row

   Note: convert your memory into Mega Byte.
2. a) Differentiate between raster and Vector scan display system along with their architecture. 8
   b) Digitize the first octant of a circle having radius r=8 and centered at (3,4) 7
3. a) Prove that successive translation and rotation is additive. 8
   b) Explain the role of composite transformation in 2D/3D geometric transformation. Explain viewing pipelining in 2D. 7
4. a) What is 3D transformation? Rotate the triangle A(0,0), B(2,2), C(4,2) about the origin by an angle of 45°. 8
   b) How you represent different objects in 3D. Differentiate between parallel and perspective projection with example? 7
5. a) What is Mach band effect? Differentiate between Gouraud and Phong shading. 8
   b) Define color model in computer graphics. Differentiate between additive color and subtractive color. 7

6. a) Explain the importance of hidden surface removal in computer graphics. What are the drawbacks of z-buffer method and how it is corrected in A-buffer? 7

   b) Explain how machine independent graphical language are more preferable to develop graphical project. 8

7. Write short notes on: **(Any two)** 2×5

   a) Open GL

   b) Beizer curve

   c) Polygon Table

POKHARA UNIVERSITY

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Attempt all the questions.

1. a) Compare and contrast the Raster and Random system with the necessary diagram. 7
   b) Define resolution and persistence. Explain the digital to analog converter in frame buffer organization? 8
2. a) Write Bresenhams line drawing algorithm along with necessary derivation for positive slope less than 1 i.e. $|m|<1$.Trace the algorithm for the line with end points A(6,12) and B(10,15). 8
   b) Explain the Sutherland Hodgeman polygon clipping algorithm considering the four different cases. 7

   OR

   Let R be the rectangular window whose lower left hand corner is at L (-3, 1) and upper right-hand corner is at R (2, 6). Use Cohen – Sutherland algorithm to clip the line segments A (-4, 2) and B (-1, 7).
3. a) Derive a composite transformation matrix for reflecting an object about a line y=x+4 in 2D 7
   b) Differentiate between window and viewport. Derive a matrix for window to viewport transformation. 8
4. a) What do you mean by a projection? Derive an expression to obtain the perspective projection of any arbitrary point. 7
   b) Why filling algorithm is required in computer graphics? Explain about scan line polygon filling algorithm. 8
5. a) What are the different ways of representing 3D objects in computer Graphics? Explain how can you represent a polygon surface as a 3D-object. 8
   b) Why is it necessary to detect visible surfaces, in case of 3D viewing? Explain Z-buffer Algorithm for hidden surface removal. 7
6. a) Describe how Gouraud Shading algorithm can be used in rendering a realistic 3D object. 7
   b) Why do we need the machine independent graphical languages? List out some of the graphical file formats and explain them in short. 8

7. Write short notes on: **(Any two)** 2×5

a) Diffuse us specular Reflection
b) Color models
c) Application of computer graphics

POKHARA UNIVERSITY

Level: Bachelor
Programme: BE
Course: Computer Graphics

Semester: Fall

Year : 2022
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

1. a) Define Computer Graphics? Explain the applications of CG in Computer Simulation, Scientific Visualization and CAD. 7
   b) Define Refresh rate and Resolution. Consider a raster scan system having 20-inch by 30-inch screen with a resolution of 300 pixels per inch in each direction. If the display controller of the system refreshes the screen at a rate of 60 frames per second, how many pixels could be accessed per second and what is the access time per pixels of the system. 8
2. a) Define CRT? Explain with neat diagram about the working principle of shadow mask method? 7
   b) Consider a line from (2,1) to (8,3) using DDA algorithm to rasterize a line. 8
3. a) Explain the boundary fill algorithm in detail. How this approach differs from flood fill? 8
   b) Prove that: 7
      i. Two successive Translations are Additive
      ii. Two successive Scaling are Multiplicative
4. a) Window port is given by (100,100,300,300) and viewport is given by (50,50,150,150). Convert the window port coordinate (200,200) to the viewport coordinate. 7
   b) A mirror is placed vertically such that it passes through the points (5, 0) and (0, 5). Find the reflected view of triangle ABC with coordinates A (5, 30), B (30, 50) and C (20, 60). 8
5. a) How do you represent 3D objects by using Polygon Tables? How is the consistency of geometric data table checked and what are the rules for generating error free polygon tables?

6.

7.

	b)	What is OpenGL? Why GLUT is implemented in OpenGL Explain Callback function.	8
6.	a)	Derive the equation for cubic Bezier curve and find the coordinate at t=0.2 with respect to the control points (1, 1), (4, 6) (8,-3) and (12, 2).	8
	b)	Why depth sorting method is called Painter's Algorithm? Explain scan line method for visible surface detection with an example.	7
7.		Write short notes on: (**Any two**)	2×5
	a)	Light pen	
	b)	Color models	
	c)	Phone shading	

POKHARAENGINEERING COLLEGE
INTERNAL ASSESSMENT

Level: Bachelor Semester – Fall Year : 2023
Programme: B.E. Full Marks: 100
Course: Computer Graphics (III Sem) Time : 3 hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

1a. Define Computer Graphics? Explain the application computer graphics in simulation, Entertainment and Cartography. 8
b. How much time is spent scanning across each row of pixels during screen refresh on a raster system with a resolution of 1280 by 1024 and a refresh rate of 60 frames per second? 7
2a. Differentiate between Beam penetration method and shadow mask method. 7
b. Consider a line from (2,1) to (8,3) using DDA algorithm to rasterize a line. 8
3a. Explain symmetry of circle. Digitize a circle for the equation: $(x-6)^2+(y-7)^2=36$ 8
b. What is uniform scaling? Reflect an object(2,3),(4,3),(4,5)about linei. y=0 and ii y=x. 7
4a. Prove that: i. Two successive Translations are Additive
ii. Two successive Scaling are Multiplicative 8
b. Clip a line with endpoints A (5,30), B (20,60) against a clip window with lowermost corner P1(10,10) and upper right corner P2(100,100) 7
5a. Explain about Polygon edges and polygon tables for 3D representation with example. 8
b. Define projection. Derive an equation for perspective projection. 7
6a. Explain about Z-buffer method for detecting visible surface with its drawback and remedy. 8
b. What is illumination model? Differentiate between Phong Shading and Gouraud Shading. 7
7 Write Short notes on: (Any Two) 10
a. Bezier Curve
b. Sutherland Hodgemann Clipping
c. Composite Transformations

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Write Short notes on: (Any Two) 10
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1.	a) Compare and contrast raster scan display and vector scan display architecture. b) Rasterize the circle with diameter 20 unit.	7 8
2.	a) How flood fill techniques is different from boundary fill technique? Explain with their psuedocode b) Derive a transformation matrix due to perspective projection.	8 7
3.	a) Find the transformation matrix to enlarge double of triangle size formed by coordinates A(0,0),B(1,1),C(5,2) such that point (5,2) remains same. b) Explain two dimensional line clipping algorithm with suitable example.	7 8
4.	a. Describe the rotation of an object about an axis , which is parallel to any of three coordinate axes of coordinate system. b. Explain depth sorting method for visible surface determination with suitable example.	8 7
5.	a. Develop an illumination model for a point source considering the effect of ambient light, diffused and specular reflection. b. Why it is necessary to know about fractal geometry method in computer graphics? Explain.	7 8
6.	a. Define Resolution and refresh rate . How computer graphics is different from image processing? b. Explain beam penetration and shadow mask method for color generation. c. Explain the function in OPENGL for projection and lighting.	5 5 5
7.	Write short notes on **(Any Two)** a. Recent trend in computer graphics b. RGB color model c. Successive translation are additive	5 × 2