

POKHARA UNIVERSITY

Level: Bachelor
Programme: BE
Course: Computer Graphics

Semester – Fall

Year : 2011
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) What is computer graphics? Describe its significance in modern world with reference to its various application areas. 8
b) Explain the working principles of various types of tablets. 7
2. a) Define resolution. What are the factors affecting resolution? Differentiate between vector and raster scan systems. 8
b) What are the differences between the raster and random scan line technology used in display devices? 7

OR

- Derive Bresenham's line drawing algorithm for $|m| > 1$. 7
3. a) Explain the 2D viewing pipeline along with the derivation for the window to viewport transformation. 8
b) Reflect the triangle with vertices A(2,2), B(4,1) and C(5,3) along the line $x = 3$. 7
 4. a) Define window and view port. What are the different steps of two dimensional world to screen viewing transformation? Describe with matrix representation at each steps. 8
b) Why we need machine independent graphical languages? Explain briefly about any two of the graphical file formats. 7
 5. a) What is hidden surface problem? Write scan line algorithm for same. 7
b) Derive an equation for calculating the total intensity due to specular reflections. 8
 6. a) Explain how a 3D object is represented using polygon surface method. 7

8

- b) What is meant by a project? Describe the significance of making plans for project development with appropriate illustrations.

7. Write short notes on **any two**:

2×5

- a) Methods for generating non planner surfaces
- b) Digitizer
- c) PHIGS

POKHARA UNIVERSITY

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Attempt all the questions.

1. a) Why do you think that computer graphics has found its usage in practically all fields? Explain. 7
b) Explain different types of touch panels with its working mechanisms. 8
2. a) What are techniques used by colour CRT monitors. Explain shadow mask method using Figure. 7
b) Consider a noninterlaced raster monitor with a resolution of n by m (m scan lines and n pixels per scan line), a refresh rate of r frames per second, a horizontal retrace time of t_{horiz} , and a vertical retrace time of t_{vert} . What is the fraction of the total refresh time per frame spent in retrace of the electron beam? 8
3. a) Describe the symmetric property of a circle. Also derive the mid-point circle algorithm 7
b) Clip the line from $(-2, 3)$ to $(18, 13)$ against the window dimension: lower left corner $(0, 0)$ and upper right corner $(20, 100)$ using Cohen Sutherland algorithm. 8
4. a) Given a diamond shaped polygon with vertices $V_1(5, 5)$, $V_2(3, 3)$, $V_3(5, 1)$ and $V_4(7, 3)$, reject the object about a line $y = x + 2$. 8
b) What are benefits of making use of Graphics Standards? Briefly mention any two graphics standards for developing graphics programs. 7
5. a) Derive a transformation matrix for perspective projection. 7
b) Why polygon is called standard graphics object? Explain Z- buffer method of hidden surface removal technique. 8
6. a) How would you reflect an object about any arbitrary axis that is not parallel to any of the major coordinate axis in 3D? 7
b) What does a project mean? Consider a project of your kind. What sort 8

of plans would you make (better be specific on your product) to develop the product that ensures all your necessities?

7. Write short notes on **any two**:

2×5

- a) Raster Vs. Random Scan Display Technology
- b) Graphical File formats
- c) Prove that following transformations are commutative
 - i. Two successive translation
 - ii. Two successive rotation

POKHARA UNIVERSITY

Level: Bachelor
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Course: Computer Graphics

Semester: Spring

Year : 2012
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Time : 3hrs.

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Attempt all the questions.

1. a) Explain the need and use of graphics in the field of IT. 7
b) What is Video Controller? Explain the basic video-controller refresh operations with proper block diagram. 8
2. a) Enlist different types of input devices. Describe touch panel as an input device. 7
b) Derive the Bresenham's line algorithm for $|m| > 1$. 8

OR

Clip the line P_1P_2 with $P_1(0,120)$ and $P_2(130,5)$ using Cohen-Sutherland Line Algorithm. Given that rectangular window ABCD has end-points $A(10,100)$, $B(150,100)$, $C(150,10)$ and $(10,10)$.

3. a) Digitize a standard form circle using midpoint algorithm having radius of 10 unit. 7
b) Explain transformation of 2D object to screen viewing with matrix derivation. 8

OR

Calculate viewing transformation matrix with given information: given triangle with sides $A(5,5)$ $B(15,5)$ $C(10,10)$, given window coordinate $(7,4)(13,4)(13,8)$, $(7,8)$ and view port location is $(17,7)(18,8)(17,8)$?

4. a) Scale the triangle with vertices $A(0,0)$, $B(1,1)$, $C(5,2)$ to half its size while keeping $B(1,1)$ fixed. 8
b) Briefly explain the different graphics file format. 7
5. a) What do you mean by projection? Differentiate between parallel and perspective projection. 7
b) Write down the Drawbacks of Backface Detection. Explain Z-buffer 8

Algoritim.

6. a) Explain Gouraud shading method. How is it different from Phong shading method? 8
- b) Explain the things to be considered while developing a project. 7
7. Write short notes on: (Any two) 2×5
- a) Differentiate between Raster-Scan and Random-Scan system.
- b) Explain different file formats.
- c) Polygon Table.

POKHARA UNIVERSITY

Level: Bachelor
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Course: Computer Graphics

Semester: Fall

Year : 2013
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Pass Marks: 45
Time : 3hrs.

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Attempt all the questions.

1. a) Define Computer graphics. Discuss the major application areas of computer graphics. 8
b) Define resolution & persistence. What is the difference between raster scan display and vector scan display? 7
2. a) Consider two raster systems with resolutions of 640 by 840 and 1280 by 1024. How many pixels could be accessed per second in each of these systems by a display controller that refreshes the screen at a rate of 60 frames per second? What is the access time per pixel in each system? 8
b) Describe how color pixel is displayed in a computer system? 7
3. a) Rotate the triangle A(2,3), B(5,3) and C(3,1) about a fixed point by 30°. 8
b) Derive an equation for calculating points of a circle using mid-point algorithm. 7

OR

Write a Code for drawing a full circle points.

4. a) Explain the 2D viewing pipeline along with the derivation for the window to viewport transformation. 7
b) Why we need machine independent graphical language? Explain briefly about any two of the graphical file formats. 8
5. a) What is meant by surface rendering? Explain the Gouraud Shading method for surface rendering. 7
b) What is projection? Derive the expression and matrix representation for perspective projection. 8
6. a) Write Z-buffer algorithm for detecting visible surface with its 7

drawback & remedy.

b) What is the significance of making plans for a project? What things should be considered during the project development? 8

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

- a) Touch screen.
- b) Homogeneous Co-ordinates.
- c) 3D Viewing Pipeline.

POKHARA UNIVERSITY

Level: Bachelor
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Semester: Fall

Year : 2014
Full Marks: 100
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Attempt all the questions.

1. a) Discuss the concept of the computer graphics in IT field. 5
b) Explain the need of GKS. 5
c) Explain the need for machine independent Graphical Language. 5
2. a) Compare raster scan display system with vector scan display system along with their architectures. 8
b) What is flat panel display? Explain the working principles of LCD monitor with figure 2+5
3. a) Rasterize the circle of 10 unit radius 8
b) Explain boundary fill technique with its algorithm. 7

OR

Derive equations for Bresenham's line drawing algorithm for line with slope $|m| > 1$. 7

4. a) Perform a 45 degree rotation of a line A (5,3) and B (10,15) about the origin. 8

OR

Calculate viewing transformation matrix with given information: given triangle with sides A(5,5) B(15,5) C(10,10), given window coordinate (7,4)(13,4)(13,8),(7,8) and view port location is (17,7) (18,7)(18,8)(17,8)? 8

- b) What is clipping? Explain in detail about Sutherland-Hodgeman polygon clipping algorithm. 7
5. a) Derive a transformation matrix due to orthographic and oblique parallel projection. 8
b) Derive an matrix for cubic Bezier curve formation. 7
6. a) Compare object space method with image space method Explain scan 4+4

line algorithm for detecting visible surfaces with suitable figure.

b) Explain the Constant Gouraud and Phong shading models

7

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

2×5

a) Scan line method

b) A- Buffer algorithm

c) Project development

POKHARA UNIVERSITY

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Semester: Fall

Year : 2015
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

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Attempt all the questions.

1. a) Give your opinion on why interactive graphics has been able to gain such an immense amount of popularity in diversified fields like business, engineering, medicine etc. 7
b) In case of two raster systems with resolutions of 640 by 480 and 1024 by 600, how many pixels could be accessed per second in each of these systems by a display controller that refreshes the screen at a rate of 75 frames per second? What is the access time per pixel in each system? 8
2. a) Differentiate between Random scan display and Raster scan display. 8
b) What is DDA? Derive the Bresenham's line drawing algorithm for the slope greater than one. 7
3. a) Find the raster position along the region 1 of the ellipse path in first quadrant. The semi major and semi minor axes are 8 & 7 respectively and the center is (0, 0). 7
b) Explain Sutherland-Hodgeman ploygon clipping algorithm with example. 8
4. a) Define window and view port? Derive the matrix that is responsible for placing an object from a window to viewport. 7
b) Derive the expression and matrix representation for perspective projection. 8
5. a) Why is it required to take care of issues like removal of hidden surfaces in 3D viewing? Differentiate between A Buffer and Depth Sorting Approach for detecting visible surfaces in 3D? 7
b) Differentiate between 2-D and 3-D graphics? In graphics which dimensional is more applicant. 8

6. a) Define lighting model and ambient light Differentiate phong Shading and gouraud Shading method. 7
- b) How does the Gouraud Shading algorithm interpolate intensities at different points of a polygon surface to give a smooth shading effect? What are its drawbacks? 8
7. Write short notes on: (**Any two**) 2×5
- a) Color models and its types.
- b) Back face detection.
- c) Fractal geomectry method.