

# POKHARA UNIVERSITY

Level: Bachelor

Semester: Fall

Year : 2014

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) | 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 a matrix for cubic Bezier curve formation.   | 7   |
| 6. a) Compare object space method with image space method Explain scan   | 4+4 |

1

- 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                                   |     |

word 5

POKHARA UNIVERSITY  
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Year : 2001

Full Mark : 100

Pass Mark : 50

Time : Mrs.

Level: Bachelor

Programme: Computer Engineering

Course: Computer Graphics

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. Do you think that computer graphics is an important area in our present society? Justify your answer by describing five areas where computer graphics is useful. { 15 }
2. Explain in brief { 3.5 }
- i) Touch Screen
  - ii) Tablet
  - iii) Joystick
3. Consider a non-interlaced raster monitor with resolution of  $n \times m$ , a refresh rate of  $f$  frames per seconds, a horizontal retrace time of  $t_h$  and vertical retrace time of  $t_v$ . What is the fraction of total refresh time per frame spent in retracing of the electron beam? { 15 }
4. a) What steps are required to plot a line using slope method? { 7 }
- b) Rasterize the line (1,1) to (5,5) using slope method. { 3 }
5. a) Derive the transformation  $M_L$  which reflects an object in 2d about a line  $L$ . { 7 }
- b) Find new coordinates of point  $P(2,4)$  after rotating by  $45^\circ$  about origin. { 3 }
6. a) What is boundary representation? How polygon tables are useful for modelling 3D surface. { 7 }
- b) Explain how cohen-sutherland's 2D clipping algorithm might be modified for 3D clipping? { 3 }
7. Write notes on: { 10 }
- i) Z Buffer method
  - ii) Phong shading

# Remaining

POKHARA UNIVERSITY

Level: Bachelor  
Programme: BE  
Course: Computer Graphics

Year : 2002  
Full Mark : 100  
Pass Mark : 50  
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. Write a survey on five important applications of computer graphics.   | 15     |
| 2. Draw the architecture of Raster Graphics system. Explain the refresh logic, and how the logic is implemented in <u>X</u> and <u>Y</u> registers?  | 15     |
| 3. Calculate the raster location that would be computed by Bresenham's Line drawing algorithm while scan converting a line with co-ordinate (1,1), to (8,5). Plot the line.  | 15     |
| 4. Give two lines Q(-1, 5), D(3, 8) and G(1, -2) H(3, 3) are clipping Candidates. Clip these lines against a window whose lower left hand corner is at (-8, 3) and upper right hand corner is at (4,8) using Cohen Sutherland algorithm.       | 15     |
| 5. a) Suppose you want to store the graphical data of a cycle. Suggest with justification what data structure you might choose for storing.<br>b) What is a spline? Discuss some technique that fits a curve with given set of control points. | 7 8    |
| 6. a) How can you derive a composite transformation matrix for reflecting an object in 3D about any arbitrary plane characterised by normal vector $\vec{N}$ .<br>b) Explain with example what do you mean by perspective projection?          | 10 5   |
| 7. Write Notes on:<br>a) Depth Buffer Method<br>b) Boundary Representation   | 10 5 5 |

7. Write short notes on (POKHARA) UNIVERSITY

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~~b)~~ Explain "Two successive scaling are multiplicative". Semester Spring : 2004

Programme: BE Full Marks: 100

Course: Computer Graphics Time: 3 hrs.

c) Phong shading

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

d) Polygon table.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Explain the use of computer graphics in different areas? 8
- b) What are Input devices? Explain tablets and touch panels as input devices along with their operation mechanism. 7
2. a) Derive the initial decision parameter required for drawing lines with  $|m| < 1$  using Bresenham's line drawing algorithm. 7 5
- b) Digitize the circle with radius  $r = 8$  pixels using Mid-Point Circle Drawing Algorithm. 8 8
3. a) Explain the working mechanism of monochromatic CRT with neat diagram. 10 5
- b) Differentiate between vector scan display and raster scan display systems. 5
4. a) Prove that two successive translations are additive and successive scaling are multiplicative. 8 3
- b) Write an algorithm for 2-D Window to viewport transformation by deriving Homogeneous coordinates? 7
5. a) Explain the file Format of the Graphical Image? 5 7
- b) Explain the importance of graphical language to develop the efficient graphics oriented projects or software? 5
- c) Write the algorithm for 3D rotation about a fixed point. 5 0
6. a) Derive the transformation matrix for producing parallel projection. 439 7
- b) Explain with the algorithm and necessary figures, how Z-Buffer method detects visible surfaces. 8
7. Write short note on : (any two) 2x5
- a) Phong Shading
- b) Bezier curve
- c) Illumination model

*As Donald* HPOKHARA UNIVERSITY /me. Baker

Level: Bachelor Semester - Fall Year : 2005  
Programme: BE Full Marks: 100  
Course: Computer Graphics 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.*

- ) What is computer graphics? How can computer graphics be used in education to remove illiteracy and computer awareness in contexts of Nepal. 7
- ) What are the techniques used for producing color displays? Explain with necessary diagram. 8
- ) Derive the mid point ellipse algorithm. 10
- ) Trace the coordinates in the first quadrant of a circle with radius 7 using midpoint circle algorithm. 5
- ) Explain in brief about following: 3x3
- i. 2D Scaling
  - ii. 2D Mirror
  - iii. 2D Shearing
- ) Rotate the triangle A (2, 3), B (5, 3) and C (3, 1) about a fixed point (1, 2) by  $30^\circ$ . 6
- ) What are the major issues to be taken care of for 3D graphics? How does it differ from 2D graphics? 7
- ) Explain 3D viewing pipeline. 8
- ) Derive the equation for transformation of an object about an arbitrary axis in 3-dimensional space. 8
- ) Why is it necessary to remove the hidden surface? Explain one of the image space approaches for visible surface detection. 7
- ) Why illumination model is important in computer graphics? Explain about diffuse reflection. 8
- ) What are the steps to be followed for project development? Explain. 7

7. Write short notes on (Any Two)

- a) Proof of "Two successive scaling are multiplicative".
- b) Graphics standards
- c) Phong shading
- d) Polygon table.

**POKHARA UNIVERSITY**

Level: Bachelor

Semester – Spring

Year : 2005

Programme: BE

Full Marks : 100

Course: Computer Graphics

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.*

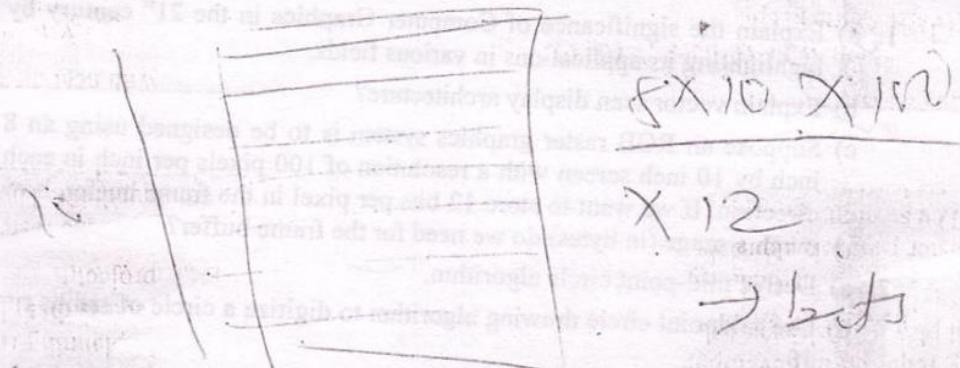
- |  |    |
|--|----|
| 1. a) Explain the significance of Computer Graphics in the 21 <sup>st</sup> century by highlighting its applications in various fields.  | 5  |
| b) Explain vector scan display architecture?   | 5  |
| c) Suppose an RGB raster graphics system is to be designed using an 8 inch by 10 inch screen with a resolution of 100 pixels per inch in each direction. If we want to store 12 bits per pixel in the frame buffer, how much storage (in bytes) do we need for the frame buffer? | 5  |
| 2. a) Derive mid-point circle algorithm.   | 10 |
| b) Use midpoint circle drawing algorithm to digitize a circle of radius $r = 10$ .   | 5  |
| 3. a) Derive a composite transformation matrix for rotating an object in a counter-clockwise direction by ' $\theta$ ' degrees about any fixed point $(x_0, y_0)$ .  | 7  |
| b) 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  |
| 4. a) Why do we need machine independent graphical languages? Write about the structure of any two graphical file formats that you are familiar with.  | 9  |
| b) Explain the importance of graphical language to develop the efficient graphics oriented projects or software.   | 6  |
| 5. a) How can you derive a composite transformation matrix for reflecting an object in 3D about any arbitrary plane characterised by normal vector $\vec{N}$ .   | 10 |
| b) Explain in brief about 3D Mirror.   | 5  |
| 6. a) Derive a transformation matrix for producing any parallel projection (orthographic and oblique) onto the $x_v y_v$ plane.  | 8  |
| b) Why are hidden-surface removal algorithms needed? How does the Z-buffer algorithm determine which surfaces are hidden?  | 7  |

7. Write short notes on (Any Two):

2x5

- a) 2D Line Clipping
- b) Used of polygon tables
- c) Project Life Cycle
- d) Gouraud Shading

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POKHARA UNIVERSITY

Level: Bachelor

Semester – Fall

Year : 2006

Programme: BE

Full Marks: 100

Course: Computer Graphics

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.*

- ) How can you apply computer graphics in the field of training? 5  
Explain.
- ) Explain working mechanism of electrical touch screen. 5
- ) Explain in brief about 2D shearing. 5
- ) Explain the Shadow Mask method used in color CRT monitors. 7  
Mention its advantages over the Beam Penetration method.
- ) List the operating characteristics for the following display technologies: Raster refresh system and Vector refresh system. 8
- ) Derive Bresenham line drawing algorithm equation for line  $|m| < 1$ . 8
- ) Digitize the line with endpoints (4,3), (12, 15) using Bresenham's line drawing algorithm. 7
- ) What do you mean by a window and a viewport? Explain (with the series of transformation matrices) how these concepts relate to window-to-viewport viewing transformation. 8
- ) Scale the triangle with vertices A (0, 0), B (1, 1), C (5, 2) to half its size while keeping B (1, 1) fixed. 7
- ) Trace the development of Graphic Software Standards with their distinguishing features and capabilities. 7
- ) Derive a sequence of transformation for rotating an object through an angle  $\phi$  about an arbitrary line in three dimensional space. 8
- ) What are the different approaches used for visible-surface detection. 8  
Discuss the approach used in Scan line method.
- ) Describe how Gouraud shading could be used for polygon rendering. 7  
Write down its disadvantage.

Write short notes on (Any Two):

2×5

- a) Project development
- b) Polygon table
- c) Perspective Projection
- d) Graphical file format

10/11

POKHARA-UNIVERSITY

Level: Bachelor

Semester - Spring

Year : 2006

Programme: BE

Full Marks: 100

Course: Computer Graphics

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.

Write about the significance of computer graphics in modern age. 8  
Express your view on the role it can play in the field of education in Nepal.

Why do we need input devices in computer graphics? Explain the working principle of light pen. 7

What is a video controller? How can a frame buffer be used for producing graphical display in case of raster graphics system? 8

Calculate the raster locations that would be computed by Bresenham's line drawing algorithm while scan converting a line with end points (12, 5) and (18, 12). 7

Is planning required in developing graphical projects? Explain other factors that play a significant role in developing an efficient graphical project. 8

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

Define clipping? Explain cohen-sutherland line clipping algorithm with neat diagram? 8

Magnify the triangle with vertices A (0, 0), B( 2, 2), C (4, 1) to double of its size while keeping C (4, 1) fixed. 7

Explain various transformation steps involved in converting world coordinate description of a scene into device coordinates, in 3D viewing? 7

Differentiate between 2-D and 3-D graphics? Explain rotation in 2D and 3D with matrix representation? 8

What do you mean by an image space method and object space method? How does the z-buffer from scan line approach in detecting visible surfaces. 8

1 (21) 1  
b) Why surface rendering is needed? Explain phong shading in brief.

7

7. Write short notes on (Any Two):

5×2

- a) Software standard
- b) Tablets
- c) Homogenous coordinate
- d) Specular reflection

## POKHARA UNIVERSITY

Level: Bachelor

Semester – Fall

Year : 2007

Programme: BE

Full Marks : 100

Course: Computer Graphics

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) Explain the use of computer graphics in different areas. 7
- b) Draw the clear diagram of monochromatic CRT and explain the working principle. 8
2. a) Draw the block diagram of vector and raster graphics display architecture and write the advantages and disadvantages of both display architecture. 8
- b) Find the raster position along the region 1 of the ellipse path in first quadrant. The semi major and semi minor axes are 8 and 7 respectively and the centre is (10, 10). 7
3. a) Define Clipping? Explain Cohen-Sutherland line clipping algorithm with neat diagram. 8
- b) Write a composite transformation matrix for a point if it is reflected by the line (i)  $x = 2$ , and (ii)  $y = 3$ . 7
4. a) Depth Buffer method is an image space method. Justify your answer? Write the depth buffer algorithm? 7
- b) Explain the Phong Shading method? Differentiate it with Gouraud Shading method? 8
5. a) Why standardization of graphical language is necessary? Briefly explain PHIGS and PHIGS+. 7
- b) Mention the need of shading in data visualization. Explain ambient, diffuse and specular reflection. 8
6. a) Derive the composite transformation matrix of 3D fixed point scaling. 5
- b) Derive the matrix for oblique projection. 5
- c) Briefly explain various image file format. 5
7. Write short notes on (Any Two): 5x2
  - a) Polygon Table
  - b) Data Glove
  - c) Methods for generating non planner surfaces
  - d) Project Development

## POKHARA UNIVERSITY

Level: Bachelor

Semester – Spring

Year : 2007

Programme: BE

Full Marks: 100

Course: Computer Graphics

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) Discuss the importance of computer graphics in the design. Differentiate between CAD and CAM. 7
- b) Why do you need input devices in Computer Graphics? Explain the working principle of different Touch panel. 8
2. a) Explain the advantages and disadvantages of raster and vector display technology. Write in brief the techniques used for producing color displays. 7
- b) How do you implement symmetry concept while drawing circle? Write the algorithm steps for drawing circle using mid-point concept. 8
3. a) Digitize a line from P (3, 6) to (12, 13) using DDA algorithm. What are its advantages over Bresenham's line drawing algorithm? 7
- b) Derive the homogeneous matrix for fixed point scaling and rotation in a 2D plane along with all the necessary intermediate figures. 8
4. a) Why clipping is used in the computer graphics? Explain in detail about Cohen-Sutherland line clipping algorithm. 7
- b) Highlight the need of independent graphics languages. Briefly discuss different file format used for graphical images. 8
5. a) Derive a composite matrix for reflecting an object in 3D about any arbitrary plane characterized by normal vector N. 7
- b) What is projection? Define parallel and perspective projection. Derive equation for perspective projection. 8
6. a) "Z - Buffer method is one commonly used image-space approach to detecting visible surface." Justify the statement. Also, mention its drawbacks and provide the method to overcome them. 7
- b) Describe how Phong shading could be used for polygon rendering. Write down its advantage over Gouraud shading. 8

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

2×5

- a) Steps involved in project development
- b) Polygon table
- c) Refresh rate and frame buffer

## POKHARA UNIVERSITY

Level: Bachelor

Semester – Fall

Year : 2008

Programme: BE

Full Marks: 100

Course: Computer Graphics

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? How is computer graphics applicable to the field of Education and Training, and Image processing? 7  
b) Enlist different types of input devices. Describe touch panel as an input device. 8
2. a) Differentiate between the raster and Vector display technologies. 7  
b) Derive Bresenham's line drawing algorithm for drawing line with  $|m| < 1$ . What necessary changes do you need to incorporate in it to draw lines with  $|m| > 1$ ? 8
3. a) What is clipping? Explain the Cohen-Sutherland line clipping technique. 7  
b) Briefly explain the 2D viewing pipeline. 8
4. a) It is required to reflect an object about any arbitrary axis in 3D. How would you derive a composite transformation matrix to achieve this goal? 7  
b) Briefly explain Scan line visible surface detection method. 8
5. a) Explain perspective projection? Derive the transformation matrix for perspective projection. 8  
b) What is meant by surface rendering? Explain the Gouraud Shading method for surface rendering. 7
6. a) Why is it required to choose machine independent graphical languages while working on a project? Explain any two graphical languages you are familiar with. 8  
b) What is the significance of making plans for a project? What things should be considered during the project development? 7
7. Write short notes on (*Any Two*) 2×5
  - a) Color manipulation techniques in CRT monitors
  - b) Polygon Table
  - c) Bezier Curve

## POKHARA UNIVERSITY

Level: Bachelor  
Programme: BE  
Course: Computer Graphics

Semester – Spring      Year : 2008  
Full Marks: 100  
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 its application in the field of scientific visualization and presentation, computer aided drafting and design. 8
- b) Why do we need input devices in Computer Graphics? Explain the working principle of different Digitizer. 7
2. a) How does a CRT monitor display color pictures? Compare between the raster scan displays with vector scan display in brief. 8
- b) Digitize the circle centered at (20, 50) with radius 15 by using mid-point algorithm. 7
3. a) Digitize the line having endpoints (10, 10) and 17, 20) using Bresenham's line drawing algorithm. 7
- b) What will be the final position of object whose vertices are (5, 5), (10, 5), (10, 10) and (5, 10) is first scaled with scaling factor  $S_x = 4$  and  $S_y = 6$  with reference to origin and then rotated with  $45^\circ$  in counter clockwise direction with reference to origin. 8
4. a) Why clipping is used in computer graphics? Explain in detail about Cohen-Sutherland line clipping algorithm. 8
- b) What is the need of graphical independent language? Discuss any two widely used graphical standard languages. 7
5. a) Compare object space method with image space method. Explain, How Backface detection method is used to detect visible surfaces. 8
- b) Derive the expression and matrix representation for oblique parallel and orthographic parallel projection. 7
6. a) Explain Gouraud shading in detail. What are mach bands? 8
- b) Derive a composite matrix for reflecting an object in 3D about any 7

arbitrary plane characterized by normal vector N.

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

- a) Project development
- b) Polygon Table
- c) Color Model
- d) Composite Transformation Matrix

8. Define Composite Operator. Explain its application in the field of computer vision and transformation combining two operators.

9. What do we mean when we say that in Composite Operator there is no need to wait for one operator to finish before starting the next?

10. How does a CRT monitor display colors in terms of primary colors?

11. Define the term dot product with respect to matrix multiplication.

12. Define the term dot product with respect to matrix multiplication.

13. What is the need to convert a point from one coordinate system to another? Explain with the help of diagram.

14. What is the need to convert a point from one coordinate system to another? Explain with the help of diagram.

15. What is the need to convert a point from one coordinate system to another? Explain with the help of diagram.

16. (a) Define the term dot product with respect to matrix multiplication.  
(b) Show how dot product with respect to matrix multiplication is used in computer graphics.

17. Define the term dot product with respect to matrix multiplication.

18. Define the term dot product with respect to matrix multiplication.

**POKHARA UNIVERSITY**

Level: Bachelor

Semester – Fall

Year : 2009

Programme: BE

Full Marks: 100

Course: Computer Graphics

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) CAD and CAM are the major applications of computer Graphics.<br>Justify.  | 6   |
| b) Briefly explain the architecture of raster and random CRT technology, highlighting their advantages and disadvantages as well.         | 9   |
| 2. a) Discuss about the methods for generating color in color monitors.   | 7   |
| b) How do you apply symmetry concept while drawing circle. Use midpoint algorithm to digitize circle with radius 10 and centre at (4, 3). | 8   |
| 3. a) Derive the Bresenham's line drawing algorithm for the slope greater than one.   | 8   |
| b) Reflect the triangle with vertices A(2, 2), B(4, 1) and C(5, 3) along the line $x = 5$ .   | 7   |
| 4. a) What do you mean by machine independent language? Explain any one machine independent language.                                     | 8   |
| b) How does a window differ from a viewport? Derive a matrix that is responsible for placing an object from a window to a viewport.       | 7   |
| 5. a) What is a spline? How do you make use of control points for drawing a curve as proposed by Beizer?                                  | 7   |
| b) What do you mean by projection? Differentiate between parallel and perspective projection. With examples.                              | 8   |
| 6. a) What is Hidden Surface Problem? Write scan line algorithm for same.   | 8   |
| b) Derive an equation for calculating the total intensity of light due to specular reflection at any point on a shiny surface.            | 7   |
| 7. Write short notes on (Any Two)   | 2×5 |
| a) 2D, 3D clipping  |     |
| b) Phases of Software Development   |     |
| c) Resistive Tablet   |     |

**POKHARA UNIVERSITY**

Level: Bachelor

Semester: Fall

Year : 2010

Programme: BE

Full Marks: 100

Course: Fundamental of IT

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 are the business pressures and responses in todays information Age? 5
- b) List and Explain any two types of Data transmission technology used for advanced computing applications 5
- c) What is CBIT? How it benefits in organization? 5
2. a) Explain Machine Cycle? What are the factors determine the speed of the Microprocessor? 8
- b) Describe the hierarchy of computers according to power and respective roles. 7
3. a) Explain the ERP concepts and its benefits to the organization. 5
- b) Explain the importance of electronic communication system in modern business scenario. 6
- c) Describe the OSI reference model and explain the various layers and its application. 4
4. a) Discuss the use of network and submit the merit and demerits. 5
- b) Explain what are the main components of DMBS? 5
- c) What are Database Models? Explain any one Model. 5
5. a) Describe Data organization and Access methods. 5
- b) What are the criteria for selection of Software? 5
- c) Explain Types of Information and Information Systems. 5
6. a) What are some of the issues manager must face when they initially consider doing business on the internet? 5

- b) What are the issues that have to handle when building a web store? 5
- c) Explain B2B and C2C in E-Commerce. 5
7. Write Short notes on (Any Two) 2×5
- a) EFT and GIS.
- b) AI in Business
- c) E- Governance.

5. a) Write down the equation for illumination model at any point due to different light sources. Also, consider the attenuation factor. 8
- b) How can you use depth buffer method for hidden surface problem? 7
6. a) Write the steps involved in rotating a 3-D object about an axis that is not parallel to any of the coordinate axes. Also, represent the steps in homogeneous coordinate matrix form 7
- b) What is meant by a project? Explain briefly about project life cycle? 8
7. Write short notes on any two: 2×5
- a) Frame buffer
  - b) Cohen-Sutherland line clipping algorithm
  - c) Graphics language

# POKHARA UNIVERSITY

Level: Bachelor  
Programme: BE  
Course: Computer Graphics

Semester – Spring

Year : 2010  
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) Discuss the importance of Computer Graphics for the Engineering fields. 7
- b) Compare and contrast between raster scan display and random scan display. 8
2. a) How long would it take to load a 640 by 480 frame buffer with 12 bits per pixel, if  $10^5$  bits can be transferred per second? How long would it take to load a 24-bit per pixel frame buffer with a resolution of 1280 by 1024 using this same transfer rate? 7
- b) Define the following terms: 8
  - i. Modeling coordinates
  - ii. Device Coordinates
  - iii. World coordinates
  - iv. Normalized coordinates

## OR

How do you apply symmetry concept while drawing circle. Use midpoint algorithm to digitize circle with radius 10 and centre at (4, 3). 8

3. a) Consider a triangle ABC with vertices A(1,1), B(6,1), C(6, 6). Obtain the transformed coordinates for this triangle after rotating it about an angle  $90^\circ$  and about a reference point  $(x_r, y_r) = (3,3)$ . 8
- b) Derive the Bresenham's line drawing algorithm for  $|m| > 1$ . 7
4. a) What are the different graphical packages available currently? Explain about the few functions associated with any one of them. 8
- b) What is projection? Derive the expression and matrix representation for perspective projection. 7

# 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
- b) What is meant by a project? Describe the significance of making 8

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

Level: Bachelor

Semester – Spring

Year : 2011

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. What do you mean by Computer Graphics? How it is used in education and training? 7
- b. Define the term resolution. Differentiate between vector and raster scan systems. Mentioning their advantages and disadvantages. 2+3+3
2. a. What are techniques used by color CRT monitors. Explain shadow mask method using figure. 7
- b. Write Bresenham's line drawing algorithm for slope  $|m| < 1$ . How does it differ from the algorithm for slope  $|m| > 1$ ? 8
3. a. Prove that following transformations are commutative. 8
  - i. Two successive translation
  - ii. Two successive rotation
- b. Reflect the triangle with vertices A (2, 2), B (4, 1) and C (5, 3) along the line  $y = 3$ . 7
4. a. Explain any two graphical languages you are familiar with highlighting their significance. 7
- b. Why is it required to choose machine independent graphical languages while working on a project? Explain various phases of project development. 8
5. a. Explain how you would rotate an object by angle  $\theta$  about arbitrary plane in 3D space. 7
- b. What do you mean by visible surface detection method? Describe Z-buffer method. 8
6. a. What is projection? Derive the expression and matrix representation for orthographic parallel projection. 8

- b. Define Bezier curve and the following terms associated with it: 7
- Control points
  - Convex hull
7. Write short notes on **any two:** 2×5
- Data glove
  - Input devices
  - Tablets

# POKHARA UNIVERSITY

Level: Bachelor

Semester – Fall

Year : 2012

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) 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 V1(5,5), V2(3,3) V3(5,1) and V4(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\*
  - 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	Semester: Spring	Year : 2012
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) 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 P1P2 with P1(0,120) and P2(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

1

Algorithm.

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) 2×4
  - a) Differentiate between Raster-Scan and Random-Scan system.
  - b) Explain different file formats.
  - c) Polygon Table.

# POKHARA UNIVERSITY

Level: Bachelor

Semester: Fall

Year : 2013

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. 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  $30^\circ$ . 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 drawback & remedy. 1 7
- 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  
 Programme: BE  
 Course: Computer Graphics

Semester: Spring

Year : 2013  
 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 are components that computer graphics consists of? Explain them with diagram. 8
- b) On an average it takes 200 nano second to access a pixel value from the frame buffer and glow a phosphor dot on the screen for a Raster System. If total resolution of the screen is 1024 x 1024, will this access rate create a flickering effect on the screen? Illustrate 7
2. a) Explain the architecture of raster display with a neat block diagram. 8
- b) While scan converting an ellipse, how do we know that we have reached the second region of the first quadrant of the Ellipse? Explain with a expressions. 7
3. a) Digitize a line with end points A(2,10) and B(5,18) using Bresenham's Line drawing algorithm. 8
- b) Differentiate between window port and view port. Derive the transformation matrix for window to view port transformation. 7
4. a) What is the significance of Clipping operation? Explain the Clipping operation used for clipping lines in 2D. 8
- b) Scale a triangle A(0,0), B(1,1), C(3,2) by twice its original size, about origin and about point P(-1,-2). 7
5. a) What do you mean by projection? Differentiate between parallel and perspective projection with example. 8
- b) What do you mean by surface rendering? Explain Phong Shading method for surface rendering. 7
6. a) What do you mean by hidden surface removal? Discuss Scan Line method for removing hidden surfaces. 8
- b) What are the steps to be followed for project development? What is significance of making plans for a project? 7
7. Write short notes on: (Any two) 2×5
  - a) Light Pen
  - b) Cohen-Sutherland Line Clipping
  - c) Bezier Curves.

# POKHARA UNIVERSITY

Level: Bachelor

Semester: Fall

Year : 2014

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) | 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 |

1

- 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**

Level: Bachelor      Semester: Fall      Year : 2015  
 Programme: BE      Full Marks: 100  
 Course: Computer Graphics      Pass Marks: 45  
 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.*

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 polygon 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

1

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 geometry method.

2

# POKHARA UNIVERSITY

Level: Bachelor  
 Programme: BE  
 Course: Computer Graphics

Semester: Spring

Year : 2015  
 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) Why do you think that the use of computer graphics is growing? Explain with suitable examples from various fields. 8
- b) Explain the working principle of shadow mask method with a diagram. 7
2. a) How colors are displayed in monitor? Explain. 7
- b) Explain the logic used for drawing lines with positive and negative slopes using Bresenham's Line drawing algorithm? 8
3. a) Digitize a circle centered at (100,200) and having radius 8. 7
- b) What will be the final coordinates of a triangle with vertices A(2,3) B(3,3) C(3,2) after rotating it a by 45 degrees in anticlockwise direction then shifting it down by 3 units and finally enlarging it by twice its original size? 8
4. a) What is line clipping? Explain the Cohen Sutherland line clipping algorithm. 8
- b) What role does vanishing point play in perspective projection? Explain by deriving equations for Perspective Projection by considering a vanishing point. 7
5. a) What is the significance of Homogenous Coordinate System? How can an object be reflected about an arbitrary plane in 3D? 8
- b) At what time which color models (RGB and CMYK) is important. Explain. 7
6. a) How do the ISM approaches differ from OSM approaches for detecting visible surfaces in 3D? Differentiate between Area Subdivision Method and Depth Sorting Approach for detecting visible surfaces in 3D? 8
7. b) Explain the APIs used in OpenGL for rendering Graphical objects. 7  
 Write short notes on: (Any two) 2×5
  - a) Open GL
  - b) Flood fill techniques
  - c) Input and Output Devices

**POKHARA UNIVERSITY**

Level: Bachelor      Semester: Fall      Year : 2016  
 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) "A picture speaks thousands of words"? Explain with reasons as to why this statement is true emphasizing the popularity that the field computer graphics has gained in diversified fields.  | 7 | 5. a) Differentiate between Image Space Method and Object Space Method? Also write down the Painter's algorithm.   | 7   |
| b) Consider two raster systems with resolution of 640 by 480 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 |  |     |
| 2. a) What is an Input device? Explain. Describe the working principle of a touch panel.  | 7 | 6. a) Explain the expression used for calculating the intensity of light incident on a surface due to Specular reflection? How is intensity interpolated in case of Gouraud Shading?                 | 8   |
| b) Use Liang Barsky line clipping algorithm to clip a line starting from (-11, 5) and ending at (15, 11) against the window having its lower left corner at (-6, -4) and upper right corner at (10, 8).   | 8 | b) Why is OpenGL considered to be cross language and cross platform collection of application programming interfaces for rendering objects? Explain any four OpenGL APIs that you are familiar with. | 7   |
| 3. a) How does the scan line polygon fill approach differ from flood fill approach for filling graphical images? Explain with practical examples of each of them.   | 7 | 7. Write short notes on: (Any two)   | 2×5 |
| b) A point (5, 3) is required to be rotated by 45 degrees in clockwise direction and then scaled by a factor of 3, what will be the final transformed position after applying these transformations.  | 8 | a) Mach Bands  |     |
| 4. a) Discuss why homogeneous coordinates are used in Computer Graphics for transformation computations? Also explain homogeneous transformation matrix for various 2D basic transformations.   | 8 | b) Orthographic Parallel Projection  |     |
| b) Describe different types of parallel projections. Derive the transformation matrix for parallel projection.  | 7 | c) Color Models  |     |

**POKHARA UNIVERSITY**

Level: Bachelor      Semester: Spring      Year : 2016  
 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) Computer graphics has enhanced the quality of work in many areas. Support this statement through a brief discussion on areas of application of computer graphics. Specify at least one specific application. 7
- b) Define resolution and image aspect ratio. A laser printer is capable of printing two Pages (size 9x11 inch) per second at resolution of 600 pixels per inch. How many bits per second does such device required? (Assume 1 pixel = n bits)? 8
2. a) What is Emmissive display and explain any one with example? What are the advantage and disadvantage of LCD display? 7
- b) Derive Bresenham's Line drawing algorithm for slope less than one. How can this line (with end points  $A(x_1,y_1)$   $B(x_2,y_2)$  and slope less than 1) be drawn if the starting point is taken as  $B(x_2,y_2)$ ? 8
3. a) What will be the final coordinates of a polygon with vertices  $A(3,4)$   $B(5,4)$   $C(5,2)$   $D(3,4)$  after it is reflected about a line  $y = 2x + 1$ ? 8
- b) Define boundary fill technique? Differentiate between Bresenham's line and DDA line drawing algorithm. 7
4. a) Explain the steps of 2-D viewing pipeline? How is the complexity added in 3-D viewing process in compare to 2-D viewing process? 7
- b) Why do we need clipping? Explain Cohen-Sutherland Line Clipping algorithm. 8
5. a) What do you mean by perspective projection? Derive an expression for finding perspective projection of a point onto a plain surface. 7
- b) Differentiate between RGB color model and CMY color model? Explain any two graphical file formats. 8

6. a) What is Gouraud shading? Explain it with an example. What are its drawbacks? 7
- b) Giving the computation of depth value, explain the depth buffer algorithm for detecting visible surfaces. What is its drawback? How is it removed? 8
7. Write short notes on: (Any two) 2×5
  - a) Perspective Projection
  - b) openGL
  - c) Homogenous coordinate

# POKHARA UNIVERSITY

Level: Bachelor

Semester: Fall

Year : 2017

Programme: BE

Full Marks: 100

Course: Computer Graphics

Pass Marks: 45

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.**

1. a) What do you understand by computer graphics? Mention some of the advantages of computer graphics. 2+5
- b) Explain the working principle of LCD and LED. 4+4
2. a) Explain the techniques of pixel considered as connected? Write logic to draw a circle using midpoint circle algorithm. 3+5
- b) Using the Bresenham's line drawing algorithm predict the pixels on the line from (2,2) to (12,10) 7
3. a) Show that the composition of two successive rotation are additive. 5
- b) Derive the composite transformation matrix for reflection of an object about a line  $Y=mx+c$ . Apply the derived matrix for the object A (4,2) B(7,3) C(9,2) D(10,1) on to the line  $y=3x$ . 10
4. a) What are the issues in 3D that makes it more complex than 2D? Derive an equation for 3D translation and reflection. 3+4
- b) Define Projection. Difference between parallel and perspective projection along with an equation. 2+6
5. a) Compare object space method with image space method. Explain scan line algorithm for detecting visible surfaces with suitable figure. 4+4
- b) What is Specular reflection? Explain the total intensity due to Specular reflection. 2+5
6. a) Explain Gouraud Shading and Phong Shading technique in detail with their advantage and disadvantage. 4+4
- b) Define Graphics file format. Explain with example, the need for machine Independent Graphical Language. 2+5
7. Write short notes on: (Any two) 2×5
  - a) Frame Buffer Organization
  - b) Beizer Curve
  - c) Depth Buffer method
  - d) Cohen-Sutherland

# POKHARA UNIVERSITY

Level: Bachelor  
Programme: BE  
Course: Computer Graphics

Semester: Spring

Year : 2017  
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) Compare and contrast raster scan display and vector scan display architecture. 7
- b) Define Display controller? What are the major application areas of computer graphics? 8
2. a) Define resolution. Suppose RGB raster system to be designed using on 8 inch x 10 inch 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 frame buffer? 8
- b) Digitize one octant of a circle by using midpoint circle generation algorithm center at origin and radius is 12. 7
3. a) Derive an equation for drawing a line using Bresenham's algorithm for slope less than one. 8
- b) Explain two dimensional line clipping algorithm with suitable example. 7
4. a) Differentiate between windows and viewport? Explain the steps of viewing transformation. 7

## OR

A mirror is placed vertically such that it passes through the points (10,0) and (0,10). Find the reflected view of triangle ABC with coordinates A(5,50), B(20,40) and C(10,70).

- b) Describe the rotation of an object about an axis, which is parallel to any of three coordinate axes of coordinate system. 8
5. a) Explain the back face detection method with an example. 8
- b) What is ambient light? Compare diffuse reflection with Specular reflection. 7
6. a) Explain Fast Phong shading algorithm in detail with necessary equations and figures. 7
- b) Why machine independent programming language is used? Discuss about OPENGL. 8
7. Write short notes on: (Any two) 2x5
  - a) 2D rotation
  - b) Graphics file format
  - c) RGB color model

# POKHARA UNIVERSITY

Level: Bachelor

Semester: Spring

Year : 2018

Full Marks: 100

Pass Marks: 45

Time : 3hrs.

Programme: BE

Course: Computer Graphics

*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) Explain frame buffer? How is computer graphics applicable in the field of GUI, Entertainment and medical science? Explain 5  
b) Calculate the access time for a pixel and a row for a graphics system having resolution of 1024\*640 and frequency of 60 Hz. 5  
c) Explain raster scan system with video controller. 5
2. a) How colors are displayed in monitor? 5  
b) Explain in steps the Z-buffer algorithm. 5  
c) Explain scan Line Method. 5
3. a) Derive an equation for calculating points of an ellipse. 7  
b) Rasterize the points of given line end points A( -2 , -4) and B(-6,-9) using Bresenham's line drawing algorithm. 8
4. a) What is windowing and clipping? Derive window to viewport transformation matrix. 7  
b) Apply Cohen Sutherland line clipping algorithm for calculating the saved portion of a line from (2,7) to (8,12) in a window ( $X_{wmin} = Y_{wmin} = 5$  and  $X_{wmax} = Y_{wmax} = 10$ ) 8
5. a) Define Projection? Derive a matrix for a parallel projection. 7  
b) Calculate (x, y) coordinate of Bezier curve described by the following 4 control points (0, 0), (1, 2), (3, 3), (4, 0). Assume any needed values. 8
6. a) Explain the Gouraud shading method with its advantages. 5  
b) Explain why is RGB called as additive and CMYK called as subtractive model? 5

c) Explain open GL.

7. Write short notes on: (Any two)

- a) Explain shading method of intensity interpolation.
- b) Explain different file formats.
- c) Viewing in 3D

5

2×5

## POKHARA UNIVERSITY

Level: Bachelor  
Semester: Fall  
Programme: BE  
Course: Computer Graphics

Year : 2019  
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) Explain the use of computer graphics emphasizing the application of graphics in the field of entertainment. 8
- b) Consider a non-interlaced raster monitor with a resolution of 1280x1024. If horizontal and vertical retrace times are 20 microsecond each, than calculate the fraction of the total refresh time per frame spent in retrace of the electron beam? Assume refresh rate of 60 frames per second. 7
2. a) Define Video Controller? Differentiate between Beam penetration and shadow mask method? 8
- b) Explain the working of DDA line drawing algorithm with suitable examples. Write its advantage and disadvantage. 7

**OR**

- Explain Symmetrical property of circle. Write midpoint circle algorithm and apply that algorithm to find the pixel values of the circle whose radius  $r = 10$  and centre of the circle =  $(0, 0)$ .
3. a) Define Decision Parameter in Bresenham's line drawing? Digitize a circle  $(x-2)^2 + (y-3)^2 = 25$  using a midpoint circle drawing algorithm. 8
  - b) Determine window to viewport transformation matrix for window (5, 10) (15, 20) and for viewport (8, 12) (12, 18). Note the coordinates values are for lower left and upper right corner. 7
  4. a) Why do you need clipping? Explain the Cohen Sutherland line clipping algorithm. 8
  - b) Derive the composite matrix for reflection an object about an arbitrary axis in 3D Space. 7
  5. a) Explain and derive transformation matrix of 3D rotation about a line 8

- b) not parallel to any one axis.
  - b) Distinguish between Image space and Object space method. How A-buffer method removes the drawback of Z-buffer method. 7
  6. a) What do you mean by ambient light? Compare between Additive and subtractive color model. 7
  - b) Define OpenGL? Explain the different file format used in Graphics to save image. 8
7. Write short notes on: (Any two) 2×5
- a) Pros and Cons of Vector Graphics
  - b) A-Buffer Method
  - c) Need for Machine Independent Graphical Languages.