POKHARA UNIVERSITY

Level: Bachelor Semester – Spring Year : 2005
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 significance of Computer Graphics in the 21st 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 'θ' degrees about any fixed point (x_1, y_1). 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 is 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

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.

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

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

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

   b) 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

3. a) Is planning required in developing graphical projects? Explain other factors that play a significant role in developing an efficient graphical project. 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 & 7 respectively and the center is (0, 0)? 7

4. a) Define clipping? Explain cohen-sutherland line clipping algorithm with neat diagram? 8

   b) 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

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

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

6. a) 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

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 – 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 | Semester – Spring | 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) 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 Sx = 4 and Sy = 6 with reference to origin and then rotated with 45^0 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 Gouroud shading in detail. What are mach bands? 8

   b) Derive a composite matrix for reflecting an object in 3D about any arbitrary plane characterized by normal vector N. 7

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

   a) Project development

   b) Polygon Table

   c) Color Model

   d) Composite Transformation Matrix

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. 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 – Spring | Year : 2009
Programme: BE | Full Marks: 100
Pass Marks: 45
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 it differ from Image Processing? Explain the application of computer Graphics in the field of Computer Aided Drafting and Design and Art and Entertainment. 8
   b) Define Resolution. What are the factors affecting the resolution? Differentiate between vector and raster systems. 7
2. a) Draw the neat diagram of Cathode Ray Tube (CRT) and explain the various elements of CRT. 7
   b) Calculate the point in the circumference of the circle having radius 8 unit and centre at (-5, 10) using midpoint circle algorithm. 8
3. a) Write the algorithm for symmetric DDA. Using the above algorithm find all the coordinates while plotting line segment (4,8) to (9,13) 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) Write about B-spline curve. 8
   b) Describe how phong Shading could be used for polygon rendering. Write down its advantages over Gourand shading. 7
5. a) Briefly describe the *z-buffer* algorithm for hidden surface removal. 7
   b) Define ambient, diffuse and specular reflection and briefly explain the Phong model of illumination. 8
6. a) What are various stages in project development? Explain. 8
   b) What is graphics file format. Explain any two file format. 7
7. Write short notes on (**Any Two):** 5×2
   a) Tablet
   b) RGB Color Model
   c) Polygon Table

POKHARA UNIVERSITY

Level: Bachelor | Semester – Fall | Year : 2010
Programme: BE | Full Marks : 100
Pass Mark : 45
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.	Discuss the different application areas that computer graphics deals with.	7
	b.	Explain the architecture of raster display technology used in video devices ranging from simple ones to advanced forms.	8
2.	a.	What is the difference between flat-panel displays and CRT displays? When do we use flat-panel displays, LCD and CRT displays?	7
	b.	Digitize the line with endpoints (30,2) and (40,28) using Bresenham's Line Algorithm.	8
3.	a.	Scale the triangle with vertices A(1,1), B(2,2) and C(6,3) to half its size while keeping A(1,1) fixed.	8
	b.	Explain the need of clipping. Briefly explain the Cohen-sutherland line clipping algorithm.	7
4.	a.	What are needs of graphical independent language? Discuss any two graphical independent languages with examples.	8
	b.	What are the steps to be followed for project development? Explain.	7
5.	a.	Define Bezier curve and the following terms associated with it. i. Control points ii. Convex Hull	7
	b.	Explain the difference between Gouraud and Phong interpolatin for the simulation of smooth shading across faceted surfaces. Use a diagram to assist in your explanation.	8
6.	a.	What is projection? Derive a transformation matrix for parallel projection (Orthographic and Oblique).	8
	b.	Briefly describe the z-buffer algorithm for hidden surface removal. How does it differ from scanline method?	7
7.	Write short notes on **(Any Two):**		2×5
	a.	Homogeneous coordinates	
	b.	Tablets	
	c.	Diffuse reflection	

POKHARA UNIVERSITY

Level: Bachelor | Semester – Fall | 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 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

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:** 2×5

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 | 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

Algortim.

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 | 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^{o}.	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 | 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

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 : 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)	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 cliping 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.