The Yenepoya Institute of Arts, Science, Commerce and Management
A Constituent Unit of Yenepoya (Deemed to be University)

Semester – End Examination Question Bank

Faculty Name: Puneethraj K

Department: Computer Science

Programme Name: Bachelor of Computer Applications

Course Name: 2D and 3D Graphic Design

Course Type: Core Course

Credit: 4

Semester: V

Total Marks: 75

Year: 2024

Module 1
Multiple Choice Questions (MCQs)

1. Which display device uses a phosphorescent screen to produce images?
a. CRT b. Flat Panel c. Stereoscopic d. LCD
Answer: a. CRT

2. What is the primary advantage of stereoscopic 3D displays?
a. High resolution b. Enhanced depth perception
c. Lower cost d. Greater color accuracy
Answer: b. Enhanced depth perception

3. In a Cartesian coordinate system, which axis typically represents depth in a 3D space?
a. X-axis b. Y-axis c. Z-axis d. W-axis
Answer: c. Z-axis

4. Which shading technique involves computing color at each pixel individually?
a. Flat Shading b. Gouraud Shading
c. Interpolative Shading d. Phong Shading
Answer: d. Phong Shading

5. What is the main purpose of texture mapping in graphics?
a. To change the color of an object
b. To add detailed textures to objects
c. To perform 3D transformations
d.To simplify the geometry of objects
Answer: b. To add detailed textures to objects

6. Which matrix is used for 2D transformations in computer graphics?
a. 2x2 b. 3x3 c. 4x4 d. 1x1
Answer: a. 2x2

7. What type of clipping algorithm is Cohen-Sutherland?
a. Point Clipping b. Line Clipping
c. Polygon Clipping d. Curve Clipping
Answer: b. Line Clipping

8. Which coordinate system is used to describe the position of objects in a 3D space relative to a viewpoint?
a. World Coordinate System b. Camera Coordinate System
c. Screen Coordinate System d. Viewport Coordinate System
Answer: b. Camera Coordinate System

9. What is the purpose of using homogeneous coordinates in 3D graphics?
a. To simplify perspective transformations
b. To increase color accuracy
c. To perform lighting calculations
d. To improve texture mapping
Answer: a. To simplify perspective transformations

10. In which shading technique is each vertex color calculated and then interpolated across the face of the polygon?
a. Flat Shading b. Gouraud Shading
c. Phong Shading d. Phong Reflection
Answer: b. Gouraud Shading

11. What is the primary function of a CRT display in computer graphics?
a. To produce high-resolution images
b. To provide color accuracy
c. To display images through electron beams
d. To enhance 3D depth perception
Answer: c. To display images through electron beams

12. Which display technology is known for its thin profile and lower power consumption compared to CRTs?
a. LCD b. CRT c. Stereoscopic d.Plasma
Answer: a. LCD

13. What is the main difference between affine and linear transformations?
a. Affine transformations include translation, while linear transformations do not.
b. Linear transformations include scaling, while affine transformations do not.
c. Affine transformations are only for 2D graphics.
d. Linear transformations are used only in 3D graphics.
Answer: a. Affine transformations include translation, while linear transformations do not.

14. Which shading technique calculates the color at each vertex of a polygon and then interpolates these colors across the surface?
a. Flat Shading b. Gouraud Shading
c. Phong Shading d. Texture Mapping
Answer: b. Gouraud Shading

15. In the context of graphics, what does aliasing refer to?
a. Blurring of images
b. Loss of color depth
c. Distortion due to insufficient resolution
d. Misalignment of texture maps
Answer: c. Distortion due to insufficient resolution

16. Which coordinate system is primarily used for modeling and rendering in 3D graphics?
a. Screen Coordinate System b. World Coordinate System
c. Viewport Coordinate System d. Camera Coordinate System
Answer: b. World Coordinate System

17. What does ray tracing primarily simulate?
a. The reflection of light b. The emission of light
c. The scattering of light d. The absorption of light
Answer: a. The reflection of light

18. Which matrix is typically used to represent transformations in 3D graphics?
a. 2x2 Matrix b. 3x3 Matrix c. 4x4 Matrix d. 5x5 Matrix
Answer: c. 4x4 Matrix

19. Which type of display technology involves creating images by varying the intensity of red, green, and blue phosphors?
a. CRT b. LCD c. LED d. OLED
Answer: a. CRT

20. In Pygame, which function is used to handle events such as keyboard and mouse inputs?
a. pygame.display.update() b. pygame.event.get()
c. pygame.draw.rect() c. pygame.init()
Answer: b. pygame.event.get()

Question No.	Bloom's level	COs	POs
1	Remembering	CO1	PO5
2	Understanding		
3			PO3
4			PO8
5			
6	Applying	CO2	PO5
7		CO3	
8	Understanding		
9	Applying	CO4	
10	Understanding	CO1	PO8
11			PO5
12	Remembering		
13	Understanding	CO2, CO4	
14		CO1	PO8
15			PO5
16	Applying	CO4	
17	Understanding	CO1	PO8
18	Applying	CO4	PO5
19	Remembering	CO1	
20	Applying	CO5	PO8

10-Mark Questions

1. Compare CRT and flat panel displays in terms of their working principles, advantages, and disadvantages.
2. Explain the process of window-to-viewport transformation in detail. How does it ensure proper rendering of graphics on different devices?
3. Describe the different types of specular reflection models and their applications in computer graphics.
4. Discuss the advantages of using interpolative shading over flat shading. How does OpenGL implement these shading techniques?
5. Explain how 3D transformations are applied using homogeneous coordinates. Provide an example involving translation and rotation.

6. Analyze the benefits and challenges of using path tracing compared to ray tracing for realistic image generation.
7. Describe the concept of general specular reflection and its role in enhancing the realism of shiny surfaces.
8. Discuss how coordinate bases are used to represent geometric data in different coordinate systems. Provide examples.

15-Mark Questions

1. Explain in detail the working principles of CRT, flat panel, and stereoscopic 3D displays. Compare their applications in modern computing environments.
2. Provide a comprehensive explanation of the window-to-viewport transformation and Cohen-Sutherland line clipping. Apply these concepts to a practical scenario involving a graphical application.
3. Discuss the mathematical foundations of vectors and coordinate vectors in computer graphics. Provide examples of their application in 2D and 3D transformations.
4. Compare and contrast flat shading, interpolative shading, and Gouraud shading. Discuss their respective benefits and limitations with real-world examples.
5. Analyze the role of texture mapping, aliasing, and anti-aliasing techniques in modern 3D graphics rendering. Discuss how these concepts are implemented in a game engine like Unity or Unreal Engine.
6. Evaluate the effectiveness of path tracing and ray tracing techniques in generating realistic images. Discuss the computational trade-offs involved.
7. Provide an in-depth analysis of how basic lighting and shading models, such as diffuse and specular reflection, are implemented in OpenGL. How do they contribute to the overall visual experience in a 3D scene?
8. Develop a detailed case study that involves the application of 3D transformations using homogeneous coordinates and affine transformations. Include real-world examples from computer graphics applications.

Marks	Question No.	Bloom's level	COs	POs
10	1	Analyzing	CO1	PO5
	2	Applying	CO3	PO6
	3	Understanding	CO1	PO1
	4	Applying		PO8
	5		CO4	PO7
	6	Analyzing	CO1	
	7	Understanding		PO1
	8	Applying		PO5
15	1	Evaluating		
	2	Applying	CO3	PO6
	3		CO2	PO7

	4	Analyzing	CO1	PO8
	5	Evaluating		
	6			PO7
	7			PO5
	8	Creating	CO4	PO6

Module 2

Multiple Choice Questions (MCQs)

1. Which of the following is the correct transformation matrix for a 2D rotation by angle θ?

a. $\begin{bmatrix}\cos\theta & -\sin\theta\\ \sin\theta & \cos\theta\end{bmatrix}$ b. $\begin{bmatrix}\cos\theta & \sin\theta\\ -\sin\theta & \cos\theta\end{bmatrix}$ c. $\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$ d. $\begin{bmatrix}0 & -1\\ 1 & 0\end{bmatrix}$

Answer: a. $\begin{bmatrix}\cos\theta & -\sin\theta\\ \sin\theta & \cos\theta\end{bmatrix}$

2. Which attribute controls the thickness of a line in 2D graphics?

a. Line Style b. Line Width c. Line Color d. Line Pattern

Answer: b. Line Width

3. What is the homogeneous coordinate representation of a 2D point (x, y)?

a. $\begin{bmatrix}x\\ y\end{bmatrix}$ b. $\begin{bmatrix}x\\ y\\ 0\end{bmatrix}$ c. $\begin{bmatrix}x\\ y\\ 1\end{bmatrix}$ d. $\begin{bmatrix}1\\ x\\ y\end{bmatrix}$

Answer: c. $\begin{bmatrix}x\\ y\\ 1\end{bmatrix}$

4. Which transformation is used to change the size of a 2D object?

a. Translation b. Rotation c. Scaling d. Shear

Answer: c) Scaling

5. What does the reflection transformation over the x-axis do to a point (x, y)?

a. Reflects to (-x, y) b. Reflects to (x, -y)

c. Reflects to (-x, -y) d. Reflects to (y, x)

Answer: b) Reflects to (x, -y)

6. In 2D graphics, which transformation skews the shape of an object along an axis?

a. Translation b. Rotation c. Scaling d. Shear

Answer: d) Shear

7. Which matrix is used for translating a 2D object by a vector (tx, ty)?

a. $\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$ b. $\begin{bmatrix}1 & tx\\ 0 & 1\end{bmatrix}$ c. $\begin{bmatrix}1 & 0\\ ty & 1\end{bmatrix}$ d. $\begin{bmatrix}1 & 0 & tx\\ 0 & 1 & ty\\ 0 & 0 & 1\end{bmatrix}$

Answer: d. $\begin{bmatrix}1 & 0 & tx\\ 0 & 1 & ty\\ 0 & 0 & 1\end{bmatrix}$

8. Which transformation preserves the proportions of an object during scaling?
a. Non-uniform scaling b. Uniform scaling
c. Shearing d. Reflection
Answer: b) Uniform scaling

9. Which of the following is NOT a line attribute in 2D graphics?
a. Line Width b. Line Color
c. Line Pattern d. Line Height
Answer: d) Line Height

10. The transformation matrix for reflecting over the y-axis is:
a. $\begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}$ b. $\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$ c. $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$ d. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
Answer: a. $\begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}$

11. Which operation combines multiple basic transformations into one?
a. Inversion b. Translation
c. Composite Transformation d. Reflection
Answer: c. Composite Transformation

12. Which attribute defines the internal color of a 2D shape?
a. Line Color b. Fill Color c. Grayscale Level d. Texture
Answer: b. Fill Color

13. Which transformation matrix is used to shear a 2D object horizontally by a factor of shx?
a. $\begin{bmatrix} 1 & 0 \\ shx & 1 \end{bmatrix}$ b. $\begin{bmatrix} 1 & shx \\ 0 & 1 \end{bmatrix}$ c. $\begin{bmatrix} shx & 0 \\ 1 & 1 \end{bmatrix}$ d. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
Answer: b. $\begin{bmatrix} 1 & shx \\ 0 & 1 \end{bmatrix}$

14. Which of the following transformations would not change the shape of a 2D object?
a. Translation b. Rotation c. Scaling d. Reflection
Answer: a. Translation

15. What is the effect of applying a shear transformation to a square object?
a. It becomes larger b. It rotates
c. It skews into a parallelogram d. It remains unchanged
Answer: c) It skews into a parallelogram

16. The matrix for rotating a 2D object by 90 degrees counter-clockwise is:
a. $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ b. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ c. $\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$ d. $\begin{bmatrix} 1 & 1 \\ -1 & -1 \end{bmatrix}$
Answer: a. $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$

17. Which transformation matrix reflects a 2D object about the origin?

a. $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$ b. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ c. $\begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}$ d. $\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$

Answer: a. $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$

18. Which operation can be used to create a mirrored copy of an object in 2D?
a. Translation b. Rotation c. Scaling d. Reflection
Answer: d. Reflection

19. Which of the following is not a basic 2D transformation?
a. Translation b. Rotation c. Scaling d. Clipping
Answer: d. Clipping

20. What does the scaling transformation do to an object's coordinates?
a. Changes their position b. Changes their orientation
c. Changes their size d. Changes their color
Answer: c. Changes their size

Question No.	Bloom's level	COs	POs
1	Understanding	CO2	PO5
2		CO1	PO8
3		CO2	PO5
4			
5			
6			
7	Applying		
8	Understanding		
9		CO1	PO8
10	Applying	CO2	PO5
11	Understanding		
12		CO1	PO8
13	Applying	CO2	PO5
14	Understanding		
15			
16	Applying		
17	Applying		
18	Understanding		
19			PO8
20			PO5

10-Mark Questions

1. Describe the process of applying composite transformations in 2D graphics, and explain how they differ from basic transformations.
2. Discuss the importance of matrix representation in 2D transformations, with examples of translation, scaling, and rotation.
3. Explain the procedure and significance of applying window-to-viewport transformation in 2D graphics.

4. Explain how different line attributes like thickness, pattern, and color can be manipulated in 2D graphics to enhance visual effects.
5. Discuss the effect of applying shear and reflection transformations in sequence on a 2D object.
6. Describe how matrix representations are used in homogeneous coordinates to perform a rotation transformation in 2D graphics.
7. How do color attributes contribute to the visualization and differentiation of objects in 2D graphics? Explain with examples.
8. Analyze the role of curve attributes in defining the shape and appearance of objects in 2D graphic design.

15-Mark Questions

1. Explain in detail the steps involved in performing a composite transformation involving translation, rotation, and scaling on a 2D object, and how the order of these transformations affects the final outcome.
2. Describe the complete process of applying reflection and shear transformations to a 2D object using matrix representation, and analyze their combined effect on the object.
3. Discuss the significance of character attributes in rendering text in 2D graphics, including aspects like font, size, style, and color, and how they can be manipulated to enhance readability and aesthetics.
4. Describe the process of applying 2D transformations to a complex object using homogeneous coordinates. Provide examples and discuss how these transformations can be applied sequentially to achieve desired effects.
5. Explain the role of color and grayscale levels in 2D graphics, and analyze how different levels are used to convey depth, shadow, and texture.
6. How do you apply matrix transformations to achieve translation, scaling, and rotation of an object in 2D graphics? Explain with relevant mathematical derivations and examples.
7. Discuss the importance of area fill attributes in 2D graphics and how they are used to enhance the visual appearance of objects, providing examples of different fill patterns and their effects.
8. Analyze the effect of applying multiple 2D transformations, including translation, scaling, rotation, shear, and reflection, on a complex object. Explain the cumulative impact and demonstrate with examples.

Marks	Question No.	Bloom's level	COs	POs
10	1	Applying	CO2	PO5
	2	Understanding		
	3	Applying	CO3	PO6
	4		CO1	PO6
	5		CO2	PO5
	6	Understanding		
	7		CO1	PO6
	8			

15	1	Applying	CO2	PO5
	2			
	3		CO1	PO6
	4		CO2	PO5
	5	Understanding	CO1	PO6
	6	Applying	CO2	PO5
	7	Understanding	CO1	PO6
	8	Applying	CO2	PO5

Module 3
Multiple Choice Questions

1. Which of the following describes the purpose of the viewing pipeline in 2D graphics?
a. To determine the visibility of objects within a scene.
b. To transform 3D coordinates into 2D coordinates.
c. To map world coordinates to screen coordinates.
d. To calculate the color of pixels.
Answer: c. To map world coordinates to screen coordinates

2. The viewing coordinate reference frame in 2D viewing is primarily used to:
a. Convert object coordinates into camera coordinates.
b. Set up the camera position in a scene.
c. Define a coordinate system for clipping.
d. Transform window coordinates into viewport coordinates.
Answer: c. Define a coordinate system for clipping

3. The Window-to-Viewport Coordinate Transformation is used to:
a. Scale objects in the scene.
b. Translate world coordinates to device coordinates.
c. Clip objects outside the view.
d. Transform 3D models into 2D images.
Answer: b. Translate world coordinates to device coordinates

4. Which algorithm is commonly used for line clipping in 2D graphics?
a. Sutherland-Hodgeman algorithm   b. Cohen-Sutherland algorithm
c. Bresenham's algorithm   d. Midpoint algorithm
Answer: b. Cohen-Sutherland algorithm

5. The Cohen-Sutherland algorithm divides the clipping region into:
a. 2 regions   b. 4 regions   c. 8 regions   d. 16 regions
Answer: c. 8 regions

6. What is the primary function of point clipping in 2D graphics?
a. To remove points that are outside the clipping window.
b. To scale points to fit within the window.
c. To change the color of points based on their position.
d. To move points into the viewport.
Answer: a. To remove points that are outside the clipping window

7. Which of the following is not a step in the Sutherland-Hodgeman polygon clipping algorithm?
a. Input the polygon vertices.
b. Clip each vertex against the window edges.
c. Discard vertices outside the clipping region.
d. Transform the polygon into 3D space.
Answer: d. Transform the polygon into 3D space

8. In OpenGL, transformations are applied in which order by default?
a. Translate, Rotate, Scale b. Scale, Rotate, Translate
c. Rotate, Scale, Translate d. Translate, Scale, Rotate
Answer: b. Scale, Rotate, Translate

9. The purpose of a viewport in 2D graphics is to:
a. Define the position of the camera in 3D space.
b. Set the resolution of the final image.
c. Map a window to a display area on the screen.
d. Determine the color of each pixel.
Answer: c. Map a window to a display area on the screen

10. Which transformation is essential in mapping from window coordinates to viewport coordinates?
a. Scaling b. Rotation c. Shearing d. Reflection
Answer: a. Scaling

11. The Cohen-Sutherland algorithm assigns a code to each endpoint of a line segment based on:
a. The direction of the line.
b. The position of the endpoint relative to the clipping window.
c. The distance of the line from the origin.
d. The slope of the line.
Answer: b. The position of the endpoint relative to the clipping window

12. In the Sutherland-Hodgeman algorithm, a vertex outside the clipping region:
a. Is discarded immediately.
b. Is stored and used to define new vertices.
c. Causes the entire polygon to be discarded.
d. Is used to define the edges of the new clipped polygon.
Answer: b. Is stored and used to define new vertices

13. What does the term "clipping" refer to in 2D graphics?
a. Cutting objects into smaller pieces.
b. Removing portions of objects outside a specified region.
c. Rotating objects around a point.
d. Scaling objects to fit within a region.
Answer: b. Removing portions of objects outside a specified region

14. The Sutherland-Hodgeman algorithm is primarily used for clipping:
a. Lines b. Points c. Polygons d. Textures
Answer: c) Polygons

15. The viewing pipeline in 2D graphics is responsible for:
a. Transforming coordinates to fit the viewport.
b. Clipping objects to the viewing window.
c. Setting the color of each pixel.
d. Both a and b.
Answer: d. Both a and b

16. In OpenGL, the function used to apply a viewport transformation is:
a. glTranslatef b. glScalef c. glViewport d. glRotatef
Answer: c. glViewport

17. A line that lies entirely inside the clipping window is:
a. Fully visible b. Fully invisible
c. Partially visible d. Not affected by clipping
Answer: a. Fully visible

18. When performing line clipping, a line segment that lies partially outside the clipping window:
a. Is discarded entirely b. Is clipped to fit within the window
c. Is left unchanged d. Is scaled to fit within the window
Answer: b. Is clipped to fit within the window

19. Which of the following describes a viewport in the context of 2D graphics?
a. A window on the screen where the final image is displayed.
b. A transformation matrix that scales objects.
c. A technique for shading polygons.
d. A method for clipping objects.
Answer: a. A window on the screen where the final image is displayed

20. The primary difference between point clipping and line clipping is:
a. The size of the clipping region.
b. The dimensionality of the objects being clipped.
c. The algorithm used.
d. The type of transformation applied.
Answer: b. The dimensionality of the objects being clipped

Question No.	Bloom's level	Cos	POs
1	Understanding	CO3	PO5
2			
3	Applying		PO8
4	Remembering		PO5
5			
6	Understanding		
7			
8			PO8
9	Applying		
10			
11	Understanding		PO5
12	Applying		

13	Understanding		
14	Remembering		
15	Understanding		
16	Applying		PO8
17	Remembering		PO5
18	Applying		
19	Understanding		PO8
20			PO5

10-Mark Questions

1. Explain in detail the stages of the viewing pipeline in 2D graphics, and discuss how each stage contributes to the final display.
2. Describe the process of window-to-viewport coordinate transformation with an example. How does this transformation affect the final image?
3. Discuss how clipping operations work in OpenGL. Provide examples of how point and line clipping are implemented.
4. Explain the Cohen-Sutherland line clipping algorithm. Provide a step-by-step breakdown with a diagrammatic example.
5. Describe in detail the Sutherland-Hodgeman Polygon clipping algorithm and its applications. Provide a detailed example.
6. Compare and contrast different line clipping algorithms in 2D graphics. Discuss their efficiency and accuracy.
7. Evaluate the role of transformations in OpenGL for rendering 2D scenes. How do these transformations affect the viewing and clipping operations?
8. Analyze the challenges in implementing clipping operations for polygons. How does the Sutherland-Hodgeman algorithm address these challenges?

15-Mark Questions

1. Discuss the complete 2D viewing pipeline, from defining the viewing coordinate reference frame to rendering the final scene on the screen. Illustrate each stage with examples.
2. Develop a program or pseudocode that implements the window-to-viewport transformation process. Explain how this transformation is applied in real-world applications.
3. Write and explain the implementation of Cohen-Sutherland line clipping algorithm in OpenGL. Analyze its effectiveness for different line segments.
4. Design a solution to handle polygon clipping in a complex scene using the Sutherland-Hodgeman algorithm. Discuss the challenges faced and how they are overcome.
5. Compare the different clipping algorithms (Cohen-Sutherland, Liang-Barsky, Sutherland-Hodgeman) used in 2D graphics. Evaluate their performance in terms of computational complexity and accuracy.

6. Create a comprehensive example where you demonstrate the application of viewing transformations and clipping in OpenGL for a complex 2D scene.
7. Critically analyze the role of the viewing pipeline and clipping in the overall rendering process. How do these operations affect the efficiency and quality of the rendered image?
8. Propose a new method for optimizing the Sutherland-Hodgeman Polygon clipping algorithm. Justify your proposal with logical arguments and potential benefits.

Marks	Question No.	Bloom's level	COs	POs
10	1	Understanding	CO3	PO5, PO8
	2	Applying		
	3			PO8
	4			PO5, PO8
	5			
	6	Analyzing		PO5, PO7
	7			PO5, PO8
	8			PO5, PO6, PO7
15	1	Understanding		PO5, PO6, PO8
	2	Creating		PO6, PO8
	3			PO5, PO6, PO8
	4			PO5, PO6, PO7, PO8
	5	Evaluating		PO5, PO6, PO7
	6	Creating		PO6, PO8
	7	Evaluating		PO5, PO6, PO7
	8	Creating		PO6, PO7, PO8

Module 4
Multiple Choice Questions

1. Which of the following is a characteristic of affine transformations?
a. Non-linear transformations b. Preserve points and lines
b. Only applicable to 2D graphics d. Require 2x2 matrices
Answer: b. Preserve points and lines

2. What is the purpose of a 4x4 matrix in 3D transformations?
a. To rotate objects in 2D space
b. To combine translation and scaling
c. To apply transformations in homogeneous coordinates
d. To translate objects in 2D space
Answer: c. To apply transformations in homogeneous coordinates

3. Which frame of reference is typically used to describe object positions relative to the viewer in graphics?
a. World frame b.Eye frame c. Object frame d. Coordinate frame
Answer: b. Eye frame

4. In 3D graphics, what does scaling transformation affect?
a. Orientation of an object b. Size of an object
c. Position of an object d. Lighting of an object
Answer: b. Size of an object

5. What matrix operation would you use to rotate an object around the Z-axis?
a. Multiplication by a rotation matrix b. Addition of a translation vector
c. Subtraction of a scaling matrix d. Division by a rotation matrix
Answer: a. Multiplication by a rotation matrix

6. Which matrix is used to translate a point in 3D space?
a. 3x3 matrix b. 4x4 matrix c. 2x2 matrix d. 5x5 matrix
Answer: b. 4x4 matrix

7. What is the purpose of the world coordinate system in 3D graphics?
a. To define the viewer's position
b. To define the global position of objects
c. To define the object's local coordinates
d. To define the pixel grid of the screen
Answer: b. To define the global position of objects

8. Which transformation is typically performed first when applying multiple transformations?
a. Rotation b. Scaling c. Translation d. Depends on the situation
Answer: d. Depends on the situation

9. When combining two affine transformations, the result is:
a. Another affine transformation b. A non-affine transformation
c. A linear transformation d. An invalid transformation
Answer: a. Another affine transformation

10. What is the function of the object frame in 3D graphics?
a. To control object lighting
b. To define local coordinates of an object
c. To determine object material properties
d. To manage object hierarchy
Answer: b. To define local coordinates of an object

11. Which of the following statements is true about 3x3 matrices?
a. They are used for 3D rotations including translation.
b. They are used for scaling in homogeneous coordinates.
c. They are limited to 2D transformations.
d. They can only perform rotations and scaling, not translations.
Answer: d. They can only perform rotations and scaling, not translations.

12. Which of the following operations does not require a 4x4 matrix in 3D transformations?
a. Translation b. Rotation c. Scaling d. None of the above
Answer: d. None of the above

13. What does hierarchy mean in the context of 3D graphics?
a. Organizing multiple transformations
b. Layering graphical components
c. Setting rendering priorities
d. Defining parent-child relationships among objects
Answer: d. Defining parent-child relationships among objects

14. Which of the following best describes affine transformations?
a. Non-linear transformations b. Preserve angles
c. Map parallel lines to parallel lines d. Require 2x2 matrices
Answer: c. Map parallel lines to parallel lines

15. How is a 3D object's rotation around the Y-axis represented in matrix form?
a. Using a 3x3 rotation matrix b. Using a 4x4 translation matrix
c. Using a scaling matrix d. Using a shear matrix
Answer: a. Using a 3x3 rotation matrix

16. What does moving the eye frame in 3D graphics simulate?
a. Object rotation b. Camera movement
c. Light source movement d. Object scaling
Answer: b) Camera movement

17. Which of the following transformations uses a 4x4 matrix in 3D space?
a. Translation b. Rotation c. Scaling d. All of the above
Answer: d. All of the above

18. Which transformation is performed to move objects in 3D space?
a. Translation b. Rotation c. Scaling d. Shearing
Answer: a. Translation

19. What is the key purpose of the world-object frame relationship in 3D graphics?
a. To manage lighting effects b. To define object motion in the world
c. To control object shading d. To determine object textures
Answer: b) To define object motion in the world

20. How is a transformation hierarchy typically managed in 3D graphics?
a. Through direct scaling operations
b. Through matrix multiplications
c. By layering objects
d. Using texture maps
Answer: b. Through matrix multiplications

Question No.	Bloom's level	COs	POs
1	Understanding	CO4	PO5
2			PO8
3			PO5
4			
5	Applying		PO6
6			PO8

7	Understanding		PO7
8	Analyzing		PO5
9	Understanding		PO8
10			PO5
11			PO8
12			
13			PO5
14			
15	Applying		PO6
16	Understanding		
17	Applying		PO8
18			PO5
19			
20			PO8

10-Mark Questions

1. Illustrate with examples the use of 3x3 matrices in performing rotations, scaling, and reflections in 3D graphics.
2. Explain the process of applying affine transformations using 4x4 matrices in 3D graphics, and discuss how they can be used to manipulate objects in a scene.
3. Discuss the significance of world, object, and eye frames in 3D graphics, and explain how these coordinate systems interact during rendering.
4. Describe the concept of hierarchy in 3D graphics and explain how transformations are propagated through the hierarchy with examples.
5. Explain the application of linear transformations to points in 3D graphics, and provide an example showing how translation and scaling affect a 3D object.
6. Describe the relationship between 3D world coordinates and matrices, and explain how these are used in rendering a 3D shape.
7. How do affine transformations affect points and frames in 3D graphics? Illustrate with examples.
8. Discuss how moving objects around in a 3D scene can be achieved through various transformations, including translation and rotation.

15-Mark Questions

1. Develop a comprehensive explanation of the transformation pipeline in 3D graphics, including linear transformations, affine transformations, and the role of 3x3 and 4x4 matrices. Provide examples to illustrate your points.
2. Describe the entire process of converting object coordinates to world coordinates, then to eye coordinates, and finally to screen coordinates in a 3D graphics pipeline. Discuss the transformations involved at each stage.

3. Design a system that uses hierarchy in 3D graphics to manipulate multiple objects in a scene. Explain how transformations are applied at different levels of the hierarchy with detailed examples.
4. Develop a detailed description of affine transformations in 3D graphics, explaining how 4x4 matrices can be used to perform complex operations such as rotation, scaling, and translation. Include examples that show the transformation of points and frames.
5. Illustrate the relationship between world coordinates, object coordinates, and eye frames in a complex 3D scene, explaining how transformations are applied to maintain the correct positioning and orientation of objects.
6. Develop an example that shows the use of 3x3 and 4x4 matrices in a complex 3D scene involving multiple transformations, such as rotations, scaling, and translations. Explain how these transformations affect the objects in the scene.
7. How can you use affine transformations to create animations in 3D graphics? Explain the steps involved in applying transformations to objects and frames over time, providing detailed examples.
8. Describe the process of drawing a shape in a 3D world using transformations. Discuss how world coordinates and matrices are used to position, orient, and render the shape correctly. Provide examples of the transformations involved.

Marks	Question No.	Bloom's level	COs	POs
10	1	Applying	CO4	PO6
	2			
	3	Understanding		PO7
	4			PO2
	5	Applying		PO6
	6			
	7			PO5
	8			PO6
15	1	Creating		PO6, PO8
	2	Understanding		PO7
	3	Creating		PO6
	4			PO6, PO7
	5			PO5, PO6
	6			PO8
	7			
	8			PO7

Module 5
Multiple Choice Questions

1. Which function is used to initialize all Pygame modules?
a. pygame.start()
b. pygame.init()
c. pygame.initialize()
d. pygame.begin()
Answer: b. pygame.init()

2. What is the correct way to set the background color of a Pygame window?
a. window.fill((255, 0, 0))
b. pygame.set_background((255, 0, 0))
c. window.set_color((255, 0, 0))
d. pygame.background((255, 0, 0))
Answer: a. window.fill((255, 0, 0))

3. Which event type is used to detect keyboard presses in Pygame?
a. pygame.KEYDOWN
b. pygame.MOUSEBUTTONDOWN
c. pygame.QUIT
d. pygame.KEYUP
Answer: a. pygame.KEYDOWN

4. What method is used to load an image in Pygame?
a. pygame.image.load()
b. pygame.load_image()
c. pygame.load()
d. pygame.surface.load()
Answer: a. pygame.image.load()

5. Which of the following is true about PyOpenGL?
a. It is a standalone library unrelated to Pygame.
b. It is integrated into Pygame for advanced 3D rendering.
c. It is only used for 2D graphics.
d. It is deprecated and no longer in use.
Answer: b. It is integrated into Pygame for advanced 3D rendering.

6. What method would you use to detect mouse movement in Pygame?
a. pygame.mouse.get_pos()
b. pygame.mouse.move()
c. pygame.mouse.detect()
d. pygame.mouse.position()
Answer: a. pygame.mouse.get_pos()

7. Which of the following is used to create a Pygame window?
a. pygame.display.set_mode()
b. pygame.window.create()
c. pygame.screen.setup()
d. pygame.display.start()
Answer: a. pygame.display.set_mode()

8. How do you transform an image in Pygame?
a. pygame.transform.rotate()
b. pygame.image.change()
c. pygame.transform.change()
d. pygame.rotate.image()
Answer: a. pygame.transform.rotate()

9. What function is used to create a game loop in Pygame?
a. while True:
b. pygame.loop()
c. pygame.mainloop()
d. pygame.run_loop()
Answer: a. while True:

10. Which of the following is NOT an event handled by Pygame?
a. pygame.QUIT b. pygame.MOUSEBUTTONDOWN
c. pygame.TIMER d. pygame.KEYUP
Answer: c. pygame.TIMER

11. How do you display text in a Pygame window?
a. pygame.font.render() b. pygame.text.display()
c. pygame.window.text() d. pygame.display_text()
Answer: a. pygame.font.render()

12. Which method would you use to resize a Pygame window?
a. pygame.display.set_mode((width, height)) b. pygame.window.resize()
c. pygame.screen.set_size() d. pygame.display.resize()
Answer: a. pygame.display.set_mode((width, height))

13. What object is used to handle colors in Pygame?
a. Color b. ColourObject c. RGBObject d. pygame.ColorObject
Answer: a. Color

14. Which method is used to move an image using numeric keypads?
a. Handling pygame.KEYDOWN events
b. Handling pygame.MOUSEMOTION events
c. Handling pygame.KEYUP events
d. Handling pygame.MOUSEBUTTONDOWN events
Answer: a. Handling pygame.KEYDOWN events

15. How do you load a cursor in Pygame?
a. pygame.mouse.set_cursor() b. pygame.cursor.load()
c. pygame.set_cursor() d. pygame.cursor_set()
Answer: a. pygame.mouse.set_cursor()

16. What does pygame.time.Clock() do in Pygame?
a. It sets the frame rate b. It tracks the time of day
c. It creates a timer event d. It starts a countdown
Answer: a) It sets the frame rate

17. Which of the following Pygame modules deals with sound?
a. pygame.mixer b. pygame.audio c. pygame.sound d. pygame.voice
Answer: a. pygame.mixer

18. How do you handle errors and exceptions in Pygame?
a. Using try-except blocks in Python
b. Pygame has built-in error handling.
c. Errors are logged automatically by Pygame.
d. Use pygame.error_handler()
Answer: a. Using try-except blocks in Python

19. What is a Surface in Pygame?
a. A 2D array representing images or shapes b. The main display window
c. The background layer d. A 3D object in PyOpenGL
Answer: a. A 2D array representing images or shapes

20. Which function is used to quit Pygame?
a. pygame.quit() b. pygame.end()
c. pygame.close() d. pygame.shutdown()
Answer: a. pygame.quit()

Question No.	Bloom's level	COs	POs
1	Remembering	CO5	PO8
2	Understanding		
3			
4	Applying		
5	Understanding		
6	Applying		
7			
8			
9	Understanding		PO6
10			PO5
11	Applying		PO8
12			
13	Understanding		
14	Applying		
15			
16			
17	Understanding		
18	Applying		
19	Understanding		
20	Applying		

10-Mark Questions

1. Write a Pygame program to create a window, change its size, and modify the window title.
2. Develop a Pygame application that loads an image onto a surface and allows the user to move it using numeric keypads.
3. Create a Pygame application to move a rectangular object across the screen using mouse events.
4. Explain the procedure of setting up a game loop in Pygame and its significance in game development.
5. Implement a Pygame application that displays text in a window and uses the text as a clickable button.
6. Describe the role of Pygame's Surface object in managing images and drawing shapes. Include examples of its usage.
7. Discuss how Pygame handles different display modes and explain how to switch between them in a program.
8. Write a Pygame program that uses the Time module to control the speed of moving objects in a game.

15-Mark Questions

1. Design and develop a complete Pygame application that initializes the window, loads an image, transforms it, and allows it to be moved using both the keyboard and mouse.
2. Create an interactive Pygame application that handles various events (keyboard, mouse) to control multiple objects on the screen, with different actions for each input.
3. Develop a Pygame program that integrates PyOpenGL to render basic 3D shapes, demonstrating how Pygame and OpenGL can work together.
4. Design a Pygame application that creates multiple surfaces, loads images onto them, and moves them simultaneously using different input methods (keyboard, mouse, etc.).
5. Explain and implement the process of creating a game loop in Pygame, including error handling, event management, and object transformations. Provide code examples and explain each part of the loop.
6. Design a Pygame-based project that uses text as buttons, with appropriate error handling and event management. The project should include multiple interactive elements and respond to user inputs dynamically.
7. Write a Pygame program that loads and transforms images, implementing multiple transformation techniques such as scaling, rotating, and translating. Demonstrate the effects on the images in real-time.
8. Develop a Pygame-based game that includes error handling for common issues such as invalid input or missing resources, explaining how each error is managed and resolved.

Marks	Question No.	Bloom's level	COs	POs
10	1	Applying	CO5	PO6, PO8
	2			PO5, PO8
	3			PO6, PO8
	4			
	5			PO5, PO8
	6			
	7			PO8
	8			PO6, PO8
15	1	Creating		
	2			
	3			
	4			
	5			PO6, PO7, PO8
	6			PO5, PO6, PO8
	7			PO6, PO8
	8			PO6, PO7, PO8