

CS 2401 Computer Graphics
UNIT II THREE-DIMENSIONAL CONCEPTS
Part - A

1. Categorize the 3D representations?

Boundary representation (B-reps) and space-partitioning representations.

2. What Boundary representation?

It describes a 3D object as a set of surfaces that separate the object interior from the environment. e.g. polygon facets and spline patches.

3. What space-partitioning representation?

This is used to describe interior properties, by partitioning the spatial region containing an object into a set of small, non-overlapping, contiguous solids. e.g. octree.

4. What is Blobby Object?

Some objects do not maintain a fixed shape, but change their surface characteristics in certain motions or when in proximity to other objects. Examples in this class of objects include molecular structures, water droplets and other liquid effects, melting objects and muscle shapes in the human body. These objects can be described as exhibiting "blobbiness" and are often simply referred to as blobby objects, since their shapes show a certain degree of fluidity.

5. What is projection?

The process of displaying 3D objects on a 2D display is called as Projection

6. What are the types of projection?

- Perspective projection
- Parallel projection

7. What is parallel projection?

In a parallel projection, coordinate positions are transformed to the view plane along parallel lines.

8. What is Perspective projection?

For a perspective projection object positions are transformed to the view plane along lines that converge to a point called the projection reference point.

9. What is chromaticity?

The term chromaticity is used to refer collectively to the two properties describing color characteristics: Purity and dominant frequency.

10. Define Color model.

A Color model is a method for explaining the properties or behavior of color within some particular context.

11. What are the uses of chromaticity diagram?

The chromaticity diagram is useful for the following: • Comparing color gamuts for different sets of primaries. • Identifying complementary colors. • Determining dominant wavelength and purity of a given color.

12. Give the transformation matrix for conversion of RGB to YIQ.

$$\begin{pmatrix} Y \\ I \\ Q \end{pmatrix} = \begin{pmatrix} 0.299 & 0.587 & 0.144 \\ 0.596 & 10.275 & -0.321 \\ 0.212 & -0.528 & 0.311 \end{pmatrix} \cdot \begin{pmatrix} R \\ G \\ B \end{pmatrix}$$

13. What is HSV model?

The HSV(Hue,Saturation,Value) model is a color model which uses color descriptions that have a more intuitive appeal to a user. To give a color specification, a user selects a spectral color and the amounts of white and black that are to be added to obtain different shades, tint, and tones.

14. What for CMY color model used?

A color model defined with the primary colors cyan, magenta, and yellow is useful for describing color output to hard-copy devices.

15. What are the parameters in the HLS color model?

Hue, Lightness and Saturation.

16. Define Computer animation.

Computer animation refers to any time sequence of visual changes in a scene. In addition to changing object position with translations or rotations, a computer generated animation could display time variations in object size, color, transparency, or surface texture.

17. What are the steps in animation sequence?

- Story board layout
- Object definition
- Key-frame specifications
- Generation of in-between frames

18. How frame-by-frame animation works?

Here each frame of the scene is separately generated and stored. Later the frames can be recorded on film or they can be consecutively displayed in "real-time playback" mode.

19. What is morphing?

Transformation of object shapes from one form to another is called morphing.

20. What are the methods of motion specifications?

- Direct motion specification
- Goal-directed Systems
- Kinematics and Dynamics.

Part – B

1. Explain various 3D object representations.

2. Explain 3D Transformations.

3. Explain 3D viewing.

UNIT II-3D CONCEPTS

PART-A

1. Differentiate parallel projection from perspective projection.
2. What is shear transformation
3. What are spline curves?
4. Define quadric surfaces.
5. Categorize the 3D object representations?
6. What is a B-reps?
7. What is space-partitioning representation?
8. What is Transformation?
9. What are the types of transformations?
10. What is projection? What are the types of projection?
11. Write the matrix for 3D z-axis rotation.
12. Write the matrix for 3D translation.
13. What are the steps in 3D rotation?
14. What is scaling?
15. What is shearing?
16. What is reflection?
17. Distinguish between window port & view port?
18. What is the need of homogeneous coordinates?
19. What is fixed point scaling?

PART-B

1. With suitable examples explain all 3D transformations.
2. Differentiate parallel and perspective projections and derive their projection matrices.
3. Explain about 3D object representation.
4. Write short notes on polygon surfaces and quadric surfaces.
5. Write short notes on Bezier curve and spline.
 6. Write short notes on visible surface detection methods.