United Technical College, Bharatpur, Chitwan

Computer Graphics

Chapter 5: 3D Graphics Systems

Homework #5

Date Assigned: 7th Jan, 2023	Date Due: 22nd Jan,2023

1. What are the issue in 3D that makes it more complex than 2D? Derive an equation for 3D translation and reflection.
2. 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
3. Derive a composite matrix for reflecting an object in 3D about any arbitrary plane characterized by normal vector N.
4. Explain various transformation steps involved in converting world coordinate description of a scene into device coordinates, in 3D viewing?
5. Differentiate between 2-D and 3-D graphics? Explain rotation in 2D and 3D with matrix representation?
6. Show how to use a 3 Dimensional matrix to rotate a unit cube about the axis defined by vector (1,1,1).
7. Explain in brief about 3D Mirror.
8. 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 [Hints: assume u =0, ½ and 1]
9. Derive a composite matrix for scaling an object a boot a fixed point P(x_f , y_f) in 3 D.
10. Calculate a reflection matrix for an object (0,0,0), (2,3,0), and (5,0,4) about the plane y=4.
11. What do you mean by projection? Differentiate between parallel and perspective projection. With examples.