

## C10-R3: COMPUTER GRAPHICS AND ANIMATION

### NOTE:

1. Answer question 1 and any FOUR questions from 2 to 7.
2. Parts of the same question should be answered together and in the same sequence.

Time: 3 Hours

Total Marks: 100

1.
  - a) Write the steps for clipping a polygon with respect to a rectangular window.
  - b) How is Bezier surface formed? Write the parametric vector function for Bezier surfaces.
  - c) Describe CSG representation for solids.
  - d) What do you mean by back face culling? Where do we need it?
  - e) Explain fractals and their use in computer animation.
  - f) How can we use forward kinematics to animate an object?
  - g) Describe the lump mapping of illumination.

**(7x4)**
  
2.
  - a) Derive the basic matrix for hermite cubic spline and give the blending functions and their rough sketches.
  - b) Write the properties of B-spline curves which make it better than Bezier curves. Draw a rough sketch of Bezier curve with the control points  $P_1, P_2, P_3, P_4, P_5, P_6, P_7$ .

**(10+8)**
  
3.
  - a) What are the various representation schemes for valid solids? Explain octree representation of solids.
  - b) Explain the method of ray-tracing for detecting visible surfaces.

**(12+6)**
  
4.
  - a) Write the steps for rotating a solid around any axis which is not parallel to any of the principal co-ordinate axis and does not pass through origin.
  - b) Using Cyrus Beck algorithm find the position of the visible line in the rectangular window. The line is obtained by joining (75, 500) and (500, 1500); the window is having vertices (100, 100) (1000, 100) (100, 1000) & (1000, 1000).

**(8+10)**
  
5.
  - a) What do you mean by diffuse reflection and specular reflection? Give a method for computing specular reflection vector.
  - b) Describe briefly the Gouraud and Phong shading model. Which of the two gives better results and why?

**(9+9)**
  
6.
  - a) Describe inverse kinematics using Jacobions.
  - b) Discuss Euler angle representation.
  - c) What do you mean by perception of motion?

**(8+7+3)**
  
7.
  - a) Describe flocking system technique for animation.
  - b) Discuss sin-interpolation method as applied to animation techniques.

**(10+8)**