

C10-R3: COMPUTER GRAPHICS & 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) Explain the relationship between the translations T_{t_x, t_y} , $T_{-t_x, -t_y}$ and $(T_{t_x, t_y})^{-1}$.
- b) Distinguish between parallel and perspective projections.
- c) What are hidden surface problems? How Z-buffer algorithm handles them.
- d) Discuss the generation of solid objects using sweep method.
- e) Explain how inverse kinematics works in computer based animation.
- f) When is a shadow mask used? Justify.
- g) Explain the Euler angle representation.

(7x4)

2.

- a) Perform a 45° rotation of triangle A(0,0), B(1,1) and C(5,2) about P(-1,-1).
- b) Describe the Cyrus-Back line clipping algorithm.

(6+12)

3.

- a) What is solid modeling? Explain the octrees representation of solid modeling.
- b) Show that the Bezier form of the curve segment is
$$Q(t) = (1-t)^3P_1 + 3t(1-t)^2P_2 + 3t^2(1-t)P_3 + t^3P_4$$
where the coefficients are Bernstein polynomials.

(9+9)

4.

- a) Explain the visible surface ray tracing.
- b) Describe the technique of Gouraud shading. How does it differ from Phong Shading?
- c) Describe an anti-aliasing method that can be applied on the filled circle.

(6+6+6)

5.

- a) Describe the 2D object warping.
- b) Explain the flocking behavior with regards to computer animation technology.

(9+9)

6.

- Explain the following:
- a) Collision detection
 - b) Particle systems.
 - c) Animation production

(6+6+6)

7.

- Write short notes on any **two** of the following:
- a) Parametric bicubic surfaces
 - b) Illumination models
 - c) BSP tree

(9+9)

