Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Sem-I Remedial Examination April 2010

Subject code: 710202 Subject Name: Advanced Computer Graphics

Date: 07 / 04 / 2010 Time: 12.00 noon – 02.30 pm

Total Marks: 60

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q 1 **(a)** Compare orthographic, axonometric and oblique parallel projection. What is the advantage of oblique over other two projections? Derive the transformation matrix for oblique parallel projection. **06**

(b) Derive the equation for cubic uniform B-spline curve. Prove that C^2 continuity is inherent in B-spline. **06**

Q2 **(a)** Derive formula for Hermite Surface. Also mention the condition for C^0 and C^1 continuity between two surface patches. **06**

(b) Find the matrix for mirror reflection with respect to the plane passing through the origin and having a normal vector whose direction is N = I + K. **06**

OR

(b) A cube is defined by eight vertices A(0,0,0), B(2,0,0), C(2,2,0), D(0,2,0), E(0,0,2), F(2,0,2), G(2,2,2) and H(0,2,2). Find the composite transformation matrix after rotating above mentioned cube by 45° clockwise around a line joining A(0,0,0) & H(0,2,2). **06**

Q 3 **(a)** Briefly explain the following methods to represent a solid. **06**

- Rotational sweep
- Constructive Solid Geometry(CSG)

(b) Why gamma correction is required? How can it be achieved? Briefly explain the techniques used to display image with many intensities on bi-level display. **06**

OR

Q 3 **(a)** Explain the application of BSP tree as point classification and visible surface determination with suitable example. **06**

(b) Briefly explain Halftone Approximation. Also describe applications of the same. **06**

Q 4 **(a)** In case of parallel and perspective projection, how the decision is taken whether point P1 hides the point P2 or not? Given points P1(2,4,0), P2(6,12,40) and P3(4,8,12) and a viewpoint C(0,0,-10), determine which point obscure the others when viewed from C. **06**

(b) Briefly explain the ray tracing algorithm to determine the visible surface. Which techniques are used to increase the efficiency of algorithm? **06**

OR

Q 4 **(a)** Briefly explain scan line visible surface determination algorithm with suitable example(s). **06**

(b) Explain Warnock's algorithm to determine visible surfaces with suitable example(s). **06**

Q 5	**(a)**	Briefly explain diffuse and specular reflection. Derive the formula of reflection vector(R) in case of specular reflection.	**06**
	(b)	Give illumination equation by considering effect of shadow and transparency. Briefly explain two pass Z-buffer shadow algorithm.	**06**

OR

Q 5	**(a)**	Define rendering. Compare geometry based, image based and Point based rendering techniques. Discuss rendered animation.	**06**
	(b)	Compare constant, phong and gouraud shading. Also discuss Mach band effect.	**06**

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