Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E –Ist SEMESTER–EXAMINATION – JULY- 2012

Subject code: 710202N **Date: 07/07/2012**

Subject Name: Advanced Computer Graphics

Time: 2:30 pm – 05:00 pm **Total Marks: 70**

Instructions:

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

Q.1 **(a)** Given a unit cube with one corner at (0, 0, 0) and the opposite corner at (1, 1, 1). Represent cube as pointers to vertex list and pointers to an edge list. **07**

(b) Explain aliasing and its effect in computer graphics. Briefly explain anti-aliasing methods. **07**

Q.2 **(a)** Derive the transformation matrix for oblique parallel projection. Find cavalier oblique parallel projection of pyramid with vertices A(0,0,0), B(1,0,0), C(0,1,0) and D(0,0,1).The angle between the horizontal and the projected z axis 30. **07**

(b) Briefly explain the techniques used to make visible surface algorithm more efficient. **07**

OR

(b) Briefly explain Z-buffer visible surface determination algorithm. Derive the formulas to find Z_2 at (x+1, y) if Z_1 at (x, y) is known. Same way derive formula to find Z_3 at(x, y+1) in terms of Z_1. **07**

Q.3 **(a)** Briefly explain Ray tracing visible surface determination algorithm. Briefly explain the techniques used to make algorithm more efficient. **07**

(b) Define C^0, C^1 and C^2 continuity. Derive the formula for C^2 continuity in Bezier curve. **07**

OR

Q.3 **(a)** Briefly explain BSP tree visible surface determination algorithm. "BSP tree algorithm is useful for applications in which the viewpoint changes but the objects do not" justify the statement. **07**

(b) Briefly explain advantages of B-spline over Bezier curve. Prove that B-spline has C^2 continuity inherent. **07**

Q.4 **(a)** The position vectors for the vertices of a triangular surface are given by A(20,0,0) , B(0,20,0) and C(0,0,20). A point light source is at P(0,0,30). Find the intensities at the vertices of the triangle if the ambient light intensity is 1 and the point light source intensity is 10. Assume Ka=Kd=0.3 and light source attenuation=$1/d^2$.Neglet specular effect. **07**

(b) Briefly explain Gouraud and Phong shading with their merits and demerits. **07**

OR

Q.4 **(a)** Briefly explain Specular reflection. Derive the formula to find specular reflective component. **07**

(b) Consider the triangle with vertices A(10,0,0),B(0,10,0) and C(0,0,10).Calculate the intensity at the centroid of the triangle using phong shading. Ia=1,Ip=10,ka=0.3 and Kd=0.3. Neglect specular effect. **07**

Q.5	**(a)**	Explain CIE chromaticity diagram. Derive the formula to translate CIE chromaticity coordinates to RGB color space.	**07**
	(b)	Define perspective foreshortening and vanishing point. Derive the formula for perspective projection on xy plane with centre of projection on positive z-axis at a distance d from the origin.	**07**

OR

Q.5	**(a)**	Briefly explain global illumination. Explain recursive ray tracing method.	**07**
	(b)	Briefly explain different types of animation and triangular wrapping method used in morphing.	**07**

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