

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**M. E. - SEMESTER – I • EXAMINATION – WINTER • 2013**

**Subject code: 710202N****Date: 26-12-2013****Subject Name: Advanced Computer Graphics****Time: 10.30 am – 01.00 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) Compare Surface modeling and Solid modeling. Briefly explain Polygon mesh and its representation techniques. **07**
- (b) Given a unit cube with one corner at (0, 0, 0) and the opposite corner at (1,1,1) derive the transformations necessary to rotate the cube by  $\theta$  degrees about the main diagonal from (0, 0, 0) to (1, 1, 1) in the counterclockwise direction. **07**
- Q.2** (a) Derive all necessary equations for Cubic Bezier curve. Define different continuities. Derive the condition for  $C^1$  continuity for cubic Bezier curve **07**
- (b) Compare Bezier curve and B-spline. Briefly explain the effect of multiple control points on a uniform B-spline. **07**
- OR**
- (b) Derive the equation for Hermite surface. What is the condition for  $C^1$  continuity for hermite surface **07**
- Q.3** (a) Why perspective projection is more realistic? Derive the perspective projection transformation matrix if projection plane at  $z=0$  and center of projection at  $z=-d$ . **07**
- (b) Compare image precision and object precision visible surface determination algorithms. Briefly explain Coherence and Bounding volumes to make visible surface determination algorithm more efficient. **07**
- OR**
- Q.3** (a) Briefly explain applications of parallel projection. Derive the parallel projection matrix for Cavalier Oblique projection **07**
- (b) Briefly explain Back-face culling as visible surface determination algorithm. Briefly explain the role of Back-face culling to make object precision algorithm more efficient **07**
- Q.4** (a) Briefly explain Depth-sort visible surface determination algorithm. Discuss different ambiguities and resolution in algorithm. **07**
- (b) Briefly explain diffuse and specular reflection. What is the contribution of diffuse and specular reflection in calculating intensity at a given point? **07**
- OR**
- Q.4** (a) Briefly explain Ray-tracing visible surface determination algorithm. Briefly explain techniques used to make algorithm more efficient. **07**
- (b) Briefly explain two-pass Z-buffer Shadow determination algorithm. **07**
- Q.5** (a) Compare Phong and Gouraud shading algorithms. Briefly explain Gouraud shading algorithm. **07**
- (b) Briefly explain Morphing and Facial animation **07**

**OR**

- Q.5** (a) Compare Local and Global illumination. Briefly explain recursive ray-tracing global illumination algorithm. **07**
- (b) Briefly explain CIE chromaticity diagram and its applications in computer graphics. **07**

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