## **GUJARAT TECHNOLOGICAL UNIVERSITY ME – SEMESTER-1 (OLD) EXAMINATION – WINTER 2016**

# Subject Code: 710202N **Subject Name: Advanced Computer Graphics** Time:10:30 am to 1:00 pm

Date:18/11/2016

**Total Marks: 70** 

**Instructions:** 

1. Attempt all questions.

rendering techniques.

- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- Q.1 (a) Draw the taxonomy of projection. Derive the transformation matrix for 07 axonometric diametric projection.
  - (b) Consider a unit cube whose opposite diagonal corners are placed at (0, 0, 0) and 07 (1, 1, 1). The cube is rotated about y-axis by  $\varphi = -30^{\circ}$ , about x-axis by  $\theta = 45^{\circ}$ , and then projected on to the z = 0 plane from the center of projection at  $z = z_c =$ 4. Find the composite perspective transformation matrix. Also find the principle vanishing points along all three principle axis.
- **(a)** Compare the following forms of parametric curves- Hermite, Bezier, Uniform B-07 **O.2** spline, and Non-uniform B-spline.
  - (b) Define Polygon Mesh. Given a unit cube with one corner at (0, 0, 0) and the 07 opposite corner at (1,1,1). Represent cube as pointers to vertex list and pointers to an edge list.

#### OR

- (b) What are the differences between regularized Boolean set operations and 07 ordinary Boolean set operations? Define regularized Boolean operations in terms of ordinary Boolean operations.
- Define Visible Surface Determination. Classify the visible surface Determination 0.3 **(a)** 07 algorithms and explain Depth- Buffer Algorithm.
  - (b) Explain Area subdivision algorithm to determine visible surface. 07

### OR

- Differentiate image precision and object precision. Explain Back-face culling 0.3 **(a)** 07 algorithm.
  - (b) Briefly explain the ray tracing algorithm to determine visible surfaces. How does 07 the efficiency of the algorithm can be improved?
- **O.4** The position vectors for the vertices of a triangular surface are given by A(10,0,0)07 (a) , B(0,10,0) and C(0,0,10). A point light source is at P (0, 0, 20). 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=0.2 and light source attenuation=1/d2. Neglect specular effect.
  - (b) Explain briefly Ambient, Diffuse and Specular reflection. 07

## OR

- List the various shading models & explain each with its merits and demerits. **O.4** 07 **(a)** 
  - **(b)** Define polyhedra. What is the necessary and sufficient condition for object to be 07 a polyhedron? Mention the advantages of Winged-edge representation over other boundary representation methods.
- Q.5 Explain halftone approximation with its application. 07 **(a)** Define Rendering. Compare geometry based, image based and Point based 07 **(b)**

- Q.5
- (a) Explain gamma correction. Why it is required?(b) What is animation? Briefly explain character animation and facial animation.

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