

ALCCS – NEW SCHEME

Time: 3 Hours

FEBRUARY 2013

Max. Marks: 100

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE:

- Question 1 is compulsory and carries 28 marks. Answer any FOUR questions from the rest. Marks are indicated against each question.
- Parts of a question should be answered at the same place.

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- Q.1**
- Discuss atleast four applications of computer graphics.
 - When are *Orthographic* and *Perspective* projections at their best?
 - Define Lambertian reflectors. What is diffuse-reflection coefficient? What is its value?
 - Differentiate between Object Space and Image Space Methods for visible surface detection. Which is more common?
 - Mention any four properties of B-spline curves.
 - Prove that two successive 2D-rotations are additive, i.e. $R(\theta_1) R(\theta_2) = R(\theta_1 + \theta_2)$.
 - What kind of clipping windows cannot be handled by Cyrus-Beck clipping algorithm? How such cases are handled? (7×4)
- Q.2**
- Write a note on RGB cube. What are two ways by which you can specify color in computer graphics? (8)
 - How do you identify a concave polygon? Describe two methods for splitting concave polygons using proper diagrams. (10)
- Q.3**
- Show that the order in which transformations are performed is important by applying the transformation of the triangle ABC by:
 - Rotating by 45° about the origin and then translating in the direction of the vector (1,0), and
 - Translating first in the direction of the vector (1,0), and then rotating by 45° about the origin, where $A = (1, 0)$ $B = (0, 1)$ and $C = (1, 1)$. (9)

Code: CT72**Subject: COMPUTER GRAPHICS**

- b. Suppose a rectangular window ABCD is defined such that A (-1,-2) and C (3, 1). Using Cohen-Sutherland algorithm, clip the line segment joining the points P (-20, 0) and Q (20, 30). Discuss limitations of Cohen-Sutherland algorithm. (9)
- Q.4** a. Write a brief note on Koch curve and the creation of different order of Koch curves. (6)
- b. Briefly describe:
(i) Horner's rule
(ii) Forward difference calculation. (6)
- c. Write OpenGL curve functions, line functions and Geometric transformation functions; two from each category with their meaning. (6)
- Q.5** a. What are the fundamental operations involved in projecting a 3D point to a 2D point on a Plane. Taking a suitable example explain one, two and three point perspective projections. (10)
- b. Write a brief note on CSG methods. Give an example to illustrate. (8)
- Q.6** a. Discuss Depth sorting method for hidden surface elimination. What tests are performed when there is depth overlap? (9)
- b. To render a polygon, how does Gouraud surface rendering and Phong surface rendering proceed? Explain briefly. Also discuss problems with Gouraud Shading. (9)
- Q.7** a. What are two basic properties a fractal object has? Define with examples the three groups of fractals. (9)
- b. How do you determine dimension of an object using fractal dimension method? Explain giving an example. (9)