

AMIETE – CS/IT (Current Scheme)

Time: 3 Hours

JUNE 2016

Max. Marks: 100

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

NOTE: There are 9 Questions in all.

- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.
- Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

Q.1 Choose the correct or the best alternative in the following: (2×10)

- a. A raster image is stored in a computer as
 (A) shades (B) OBJECTS
 (C) lines (D) an array of numerical values
- b. Name the printer that also scans raster patterns from an internal frame buffer, rapidly sweeping a laser beam over an internal drawing surface.
 (A) Inkjet printer (B) Dot matrix printer
 (C) Laser printer (D) All of these
- c. _____ is a function that returns a pseudorandom (an apparently random value) between 0 and some upper limit
 (A) random() (B) rand()
 (C) rad() (D) rdom()
- d. In OpenGL a _____ is a *line strip* and is drawn by drawing lines between successive pairs of points: p_0 to p_1 , p_2 to p_3 and so on.
 (A) Vertex (B) Polygon
 (C) Polyline (D) Graphs
- e. The conic is parabola
 (A) if the plane cuts one “nappe” of the cone
 (B) if the plane is parallel to the side of the cone
 (C) if the plane cuts both nappes
 (D) None of these
- f. Name the clipping algorithm which performs clipping against a convex polygon, but instead of clipping a single line segment it clips an entire polygon (which needn't be convex) against the convex polygon and its output is again a polygon.
 (A) Cohen-Sutherland (B) Cyrus-Beck
 (C) Weiler-Atherton (D) Sutherland-Hodgman

Code: AC60 / AT60**Subject: COMPUTER GRAPHICS**

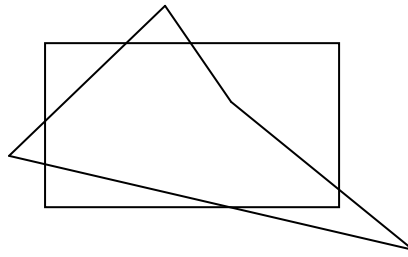
- g. The inverse transformation of an affine transformation is another affine transformation, whose matrix is the
- (A) Original matrix (B) Inverse matrix of the original
(C) Transpose matrix of the original (D) Image of the original matrix
- h. There are various ways to store polygonal mesh information in a file or program. One efficient approach uses three separate lists, a vertex list, normal list, and face list. The vertex list contains
- (A) Locational or geometric information
(B) Orientation information
(C) Connectivity or topological information
(D) All of these
- i. The _____ wraps objects so that, when viewed with an orthographic projection, they appear the same as the original objects do when viewed with a perspective projection.
- (A) Orthographic transformation (B) Projection matrix
(C) Homogeneous coordinates (D) Perspective transformation
- j. An important property assumed for diffuse scattering is that it is independent of the direction from the point, P, to the location of the viewer's eye. This is often called as _____.
- (A) Lambert's law (B) Refraction
(C) Omnidirectional scattering (D) Specular reflection

Answer any FIVE Questions out of EIGHT Questions.

Each question carries 16 marks.

- Q.2** a. Explain the different types of logical input graphics primitives. (6)
- b. Describe the several ways in which the graphics generated by program can be delivered. (5)
- c. List some hardware devices that are used to display computer graphics. (5)
- Q.3** a. What are the five principle types of call back functions for event types defined in a main() function for an event-driven program? Also write the GLUT function available with each function. (6)
- b. What are the two principle ways to describe the shape of a curved line? (6)
- c. How to specify a rectangle with the mouse? (4)
- Q.4** a. Use the Cohen Sutherland algorithm to clip line $P_1(70, 20)$ and $P_2(100, 10)$ against a window lower left hand corner (50, 10) and upper right hand corner (80, 40). (8)

- b. Write the steps for clipping the polygon given in the following figure using Sutherland-Hodgman polygon clipping algorithm? (8)



- Q.5** a. Prove that Affine transformation preserves lines and planes. (6)
 b. Perform a 45° rotation of triangle A (0, 0), B (1, 1), C (5, 2) (5+5)
 (i) about the origin and
 (ii) about P(-1, -1).

- Q.6** a. Find the isometric projection for the computer display of a cube formed by a $\theta = 30^\circ$ rotation about the y axis, followed by a $\theta = 45^\circ$ rotation about the x axis and then parallelly projected on $z = 0$. The position vectors for the cube are: (8)

$$[X] = \begin{bmatrix} 0 & 0 & 1 & 1 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 1 \\ 1 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 \end{bmatrix}$$

- b. What is Orthographic Projection? Describe the different types of Orthographic projection. (8)
- Q.7** a. What are the two different types of reflection of incident light? (4)
 b. Differentiate between Gouraud shading & Phong shading. (6)
 c. Explain Depth-Buffer approach to remove hidden surface. (6)
- Q.8** a. What are the different ways to define a region? (7)
 b. Describe the different approaches to antialiasing techniques. (9)
- Q.9** a. Find the equation of the Bezier curve which passes through (0, 0) and (-4, 2) and controlled through (14, 10) and (4, 0). (8)
 b. Define de Casteljau algorithm. What is the application of de Casteljau algorithm to Bezier curve? (2+6)