

AMIETE -CS (OLD SCHEME)

Code: AC15
Time: 3 Hours

Subject: COMPUTER GRAPHICS
Max. Marks: 100

JUNE 2011

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. Coloured CRT create image of

- (A) single colour
- (B) multiple colour
- (C) single colour with no intensity information
- (D) no colours

b. Boundary fill and flood fill algorithm begins with a

- (A) Fruit
- (B) Leaf
- (C) Picture
- (D) Seed

c. A point (x, y) is rotated about origin by 30° using the transformation

$$\begin{bmatrix} x' \\ y' \\ 1 \end{bmatrix} = R \begin{bmatrix} x \\ y \\ 1 \end{bmatrix}$$

Identify the R matrix from following where $a = \sqrt{3}/2$ $b = 1/2$

(A) $\begin{bmatrix} a & b & 0 \\ b & a & 0 \\ 0 & 0 & 1 \end{bmatrix}$

(B) $\begin{bmatrix} a & -b & 0 \\ b & a & 0 \\ 0 & 0 & 1 \end{bmatrix}$

(C) $\begin{bmatrix} a & b & 0 \\ -b & a & 0 \\ 0 & 0 & 1 \end{bmatrix}$

(D) $\begin{bmatrix} a & -b & 0 \\ a & b & 0 \\ 0 & 0 & 1 \end{bmatrix}$

d. A polygon is called _____ if the line joining any two exterior points of a polygon lies completely inside the polygon

- (A) windowing
- (B) concave
- (C) convex
- (D) window

- e. Given a rectangular window P(0, 0), Q(30, 0), R(30, 20), S(0, 20), what is the outcode of an end point A(40, 10) of a line. The outcode format is L,R,B,T
- (A) 1010 (B) 0100
(C) 0110 (D) 1000
- f. Difference between parallel and perspective projection lies in the
- (A) center of attraction (B) centre of projection
(C) line of control (D) none
- g. A Bezier cubic curve with control points P_0, P_1, P_2, P_3 is defined by the equation $f(u) = \sum_{i=0}^3 P_i B_i^3(u)$. Identify B_2^3 from the following:
- (A) $(1-u)^3$ (B) u^3
(C) $3u(1-u)^2$ (D) $3u^2(1-u)$
- h. If we use 12-bit pixel address in a lookup table representation, how many bytes does the lookup table occupy
- (A) 4096 (B) 2048
(C) 1024 (D) None
- i. Cohen-Sutherland algorithm is used for
- (A) Polygon clipping (B) Graph colouring
(C) Line clipping (D) 3D Modelling
- j. Lambert's cosine law involves the angle of
- (A) refraction. (B) illumination.
(C) normal with the surface. (D) reflection.

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

- Q.2** a. Explain how shadow mask method generate colors in raster scan system? (4)
b. Describe the working of Light Pen. (4)
c. Write the steps to plot a line whose 2 end points are given as (10, 5) and (15, 9) using Bresenham's line algorithm. (8)
- Q.3** a. What steps are required to scan-convert a polygonal area using the scan line algorithm? (7)
b. Describe Midpoint subdivision clipping algorithm. (9)

- Q.4** a. Perform a 45° rotation of triangle A(0,0), B(1,1) and C(5,2) about P(-2,-2). (8)
- b. Find a transformation which aligns the vector $V = I+J+K$ with the vector $N = 2I-J-K$. (8)
- Q.5** a. Develop the transformation matrix for generating a parallel projection. (4)
- b. What do you understand by principal vanishing point? Describe the one-principal-vanishing-point-perspective transformation. (4)
- c. Write an algorithm for traversing a BSP tree. (8)
- Q.6** a. Write an expression for the Bezier curve in terms of parameter t and the 4 control points P_1, P_2, P_3 and P_4 . Using this show that the Bezier curve ends in point P_4 with slope given by line P_3P_4 . (8)
- b. What is a Bezier curve? Give the polynomial of degree n representing a Bezier curve. (8)
- Q.7** a. Explain with the help of examples the sweep representation and constructive solid geometry methods for solid geometry. (8)
- b. Explain briefly the z-buffer algorithm. How does the z-buffer algorithm determine which surfaces are hidden? (8)
- Q.8** a. Develop the specular illumination model for rendering a surface. How is it different from the diffuse model? (8)
- b. Describe how phong shading model is different from Gourad shading model? Which one is better to use? (8)
- Q.9** a. Explain what do you understand by the terms fractal dimension, initiator and generator. Illustrate with examples. (8)
- b. Write a note on Morphing. (8)