ROLL NO. _____

Code: AC15 **Subject: COMPUTER GRAPHICS**

AMIETE – CS (OLD SCHEME)

Time: 3 Hours **DECEMBER 2011** **Max. Marks: 100**

NOTE: There are 9 Questions in all.

- **Please write your Roll No. at the space provided on each page immediately after receiving the Question Paper.**
- **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. Oblique projection of an object with projection angle α such that tan α=2 is called

(A) cavalier projection **(B)** cabinet projection
(C) orthographic projection **(D)** none of these

b. Which of the following is not rigid body transformation?

(A) Reflection **(B)** Translation
(C) Rotation **(D)** Shearing

c. In the Cohen & Sutherland clipping algorithm, if the out codes of two end points of line are non zero but their AND operation gives (0000) then the line is

(A) completely invisible **(B)** completely visible
(C) partially visible **(D)** incomplete data

d. Intensities are interpolated for rendering in

(A) Bezier shading **(B)** Phong shading
(C) Gouraud shading **(D)** B-spline shading

e. DDA algorithm is used for

(A) Drawing a rectangle **(B)** Drawing a circle
(C) Drawing a polygon **(D)** Drawing a line

f. The rate at which scanning is repeated is known as

(A) resolution **(B)** refresh rate
(C) stroke rate **(D)** bandwidth

g. A line connecting the points (2, 2) and (6, 4) is to be drawn, using the DDA algorithm. Find the value of x and y increments

(A) x-increment = 1, y-increment = 1
(B) x-increment = 0.5, y-increment = 1
(C) x-increment = 1, y-increment = 0.5
(D) none of the above

h. A Bezier cubic curve with control points P_0, P_1, P_2 and P_3 is defined by the equation $P(t) = P_0 B_0^3(t) + P_1 B_1^3(t) + P_2 B_2^3(t) + P_3 B_3^3(t)$, here, $B_2^3(t)$ is

(A) $(1-t)^3$ **(B)** $3t^2(1-t)$
(C) $3t(1-t)^2$ **(D)** t^3

i. Conversion of a 3-D image to 2-D is

(A) Transformation **(B)** Projection
(C) Half toning **(D)** Clipping

j. The matrix $\begin{pmatrix} d & 0 & 0 & 0 \\ 0 & d & 0 & 0 \\ 0 & 0 & d & 0 \\ 0 & 0 & 1 & 0 \end{pmatrix}$ represents

(A) perspective projection on view plane z=d and centre of projection at origin
(B) parallel projection on view plane z=d.
(C) perspective projection on view plane z=0 and centre of projection (0,0,d).
(D) None of the above.

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

Q.2 a. Explain the Bresenham line algorithm for drawing a line with a slope less than 1 and greater than 0. **(8)**

b. Explain various types of B-spline curves. Give suitable example of each type. **(8)**

Q.3 a. Perform a 30^o rotation of the triangle A(0,0), B(4,3) and C(6,3)
(i) about the origin and (ii) about the point P(-1,-1). **(8)**

b. Define perspective and parallel projections. Give various types of perspective and parallel projections. **(8)**

Q.4 a. What are fractals? Briefly explain self-similar, self-affine and invariant fractals with the help of examples. **(8)**

b. What is an octree? Describe briefly how an octree can be generated for an object. Write an algorithm to display an octree. **(8)**

Q.5 a. Describe the working of image scanners. **(8)**

b. Explain Bezier curves with necessary equations and figures. Describe the method for generating these curves. **(8)**

Q.6 a. Derive the intensity equations for Phong's shading model. How is it different from Gouraud model? **(8)**

b. What do you mean by aliasing? How can we avoid aliasing? Write modified Bresenham's line drawing algorithm with antialiasing. **(8)**

Q.7 a. Write scan line seed filling algorithm. Compare it with seed fill algorithm. **(8)**

b. Describe the Cohen-Sutherland technique for clipping a line with respect to a rectangular window. **(8)**

Q.8 a. Describe how the Z-buffer hidden surface removal algorithm works. **(8)**

b. Explain floating horizon algorithm to remove hidden lines from three-dimensional representations of surface functions of the form $F(x, y, z) = 0$. **(8)**

Q.9 Write short notes on any **FOUR** of the following:

(i) Binary Space Partitioning (BSP) tree
(ii) Affine transformation
(iii) Specular reflection.
(iv) Homogeneous coordinates
(v) Raster and Random display devices. **(4×4)**