ROLL NO. _____

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

AMIETE – CS/IT (Current Scheme)

Time: 3 Hours **December 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. The phenomenon of having a continuous glow of a beam on the screen even after it is removed is called as
(A) Fluorescence **(B)** Persistence
(C) Phosphorescence **(D)** Incondescence

b. Reflection of a point about x-axis, followed by a counter-clockwise rotation of 90°, is equivalent to reflection about the line
(A) $x = -y$ **(B)** $y = -x$
(C) $x = y$ **(D)** $x + y = 1$

c. The point at which a set of projected parallel lines appear to converge is called
(A) convergence point **(B)** vanishing point
(C) point of illusion **(D)** point of fusion

d. $x = at^2$; $y = at$ is the parametric equation of
(A) circle **(B)** rectangular hyperbola
(C) Parabola **(D)** ellipse

e. The anti-aliasing technique which allows shift of ¼, ½, and ¾ of a pixel diameter enabling a closer path of a line is
(A) pixel phasing **(B)** filtering
(C) Intensity compensation **(D)** supersampling

f. Control points are used to control the _____ of the curve.
(A) shape **(B)** iterations
(C) edges **(D)** values

g. Oblique projection with an angle of 45° to the horizontal plane is called as
(A) Isometric projection **(B)** Cavalier projection
(C) Axonometric projection **(D)** Cabinet projection

h. The kind of phosphor that is preferred for animation displays is of
(A) normal persistence **(B)** high persistence
(C) low persistence **(D)** medium persistence

i. LCD is categorized under which type of display device?
(A) emissive **(B)** thin-plate
(C) non-emissive **(D)** None of these

j. The minimum number of points required to draw a curve is
(A) 3 **(B)** 6
(C) 5 **(D)** 2

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

Q.2 a. What is a frame buffer? Explain the task of a display controller. In a 512×512 raster on a monochrome display with an average access rate of 200 nanoseconds per pixel, what is the refresh rate? **(2+2+4)**

b. Describe the following briefly: **(4+4)**
(i) Keyboard
(ii) Touch panel

Q.3 a. Write an OpenGL code to open an initial windows for drawing. Briefly explain any three functions used in the code. **(8)**

b. Find the normalized transformation from the window whose lower left corner is at (0,0) and upper right corner is at (4,3) on to the normalized device screen so that aspect ratios are preserved. **(5)**

c. Discuss in short Window-to-Viewpoint Mapping. **(3)**

Q.4 a. Explain in detail the Cohen-Sutherland algorithm using suitable figures. **(8)**

b. Briefly discuss the OpenGL routine that implements the Cyrus-Beck Clipper for clipping lines against a convex polygon. Also give the pseudocode of Cyrus-Beck algorithm. **(8)**

Q.5 a. Show that the product of a translation matrix and its inverse produces identity matrix in a 3D coordinate system. **(5)**

b. Show that the concatenation of two successive scaling transformation operation is multiplicative. **(5)**

c. Rotate an object defined by A(0,0), B(1,0), C(1,1), D(0,1) by 45° (anticlockwise) about the origin. Give the transformed coordinates of the object. **(6)**

Q.6 a. Describe pixmaps and useful operations on them. **(8)**

b. Give useful data types for pixmaps **(4)**

c. Discuss three commonly used antialiasing techniques. **(4)**

Q.7 a. Give the taxonomy of projection and explain it. **(8)**

b. Derive the general equation and give its equivalent matrix representation for oblique projection. What do you conclude from the derived equations? **(8)**

Q.8 a. In order to yield realistic shading what points must be considered? State the demerits of Gouraud shading and write the steps for performing Phong shading. **(8)**

b. What are image space algorithms? Discuss the depth-buffer algorithm using a suitable figure that illustrates how visible surfaces can be detected. Give one disadvantage of the algorithm. **(8)**

Q.9 a. In what way are polynomials useful in curve designing? Explain why high order polynomials are not suitable for curve design. **(8)**

b. What are Bezier Curves? Give the properties of the Bezier Curves. **(8)**