ROLL NO. _____

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

AMIETE – CS/IT

Time: 3 Hours **JUNE 2014** **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. Mono Display Adapter formed in1981by_____.

(A) VESA **(B)** Intel
(C) Motorola **(D)** IBM

b. A basic interactive picture construction technique are

(A) Positioning and pointing, constraints
(B) Grid, gravity field, rubber band method
(C) Sketching, dragging, inking and painting
(D) All of these

c. The centre of display screen is computed as

(A) $X_{max,}$ y_{max} **(B)** $X_{max}/2$, $y_{max}/2$
(C) $X_{max}/3$, $y_{max}/3$ **(D)** None of these

d. A line connecting the points (1, 1) and (5, 3) 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 these

e. In displaying a clipped picture the efficient method is?

(A) Clipping against the window and then applying the window transformation
(B) Applying window transformation and then clipping against the viewport
(C) Both A and B have the same efficiency
(D) Efficiency depends on whether the window is an aligned rectangle or not

f. The ..... simply reads each successive byte of data from the frame buffer?

(A) Digital Controller **(B)** Data Controller
(C) Display Controller **(D)** All these

g. Reflection of a point about x-axis, followed by a counter-clockwise rotation of 90^0, is equivalent to reflection about the line?

(A) x + y=1 **(B)** y = - x
(C) x = y **(D)** none of these

h. 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 delusion

i. Which of the following is NOT true about quaternions?

(A) They are made up of 4 numbers
(B) They should always be normalized to length 1
(C) They can be used to represent all affine transforms
(D) They can be used to define the rotation of an object

j. _____is used to regulate the flow of electrons in CRT?

(A) Electronic Gun **(B)** Focusing electrode
(C) Control electrode **(D)** All of these

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

Q.2 a. List the operating characteristics of the following display technologies:
i. Raster Refresh Systems
ii. Plasma Panels
iii. LCD **(9)**

b. Explain the following terms with examples: **(4+3)**
(i) Interlacing
(ii) Aspect Ratio

Q.3 a. Explain Bresenham's Line Drawing Algorithm. Give a step wise solution to digitize the line with endpoints (5, 10) and (10, 20). **(8)**

b. Write a procedure of producing Sierpinski Gasket. Explain how to control the Sierpinski Gasket with the Mouse. **(8)**

Q.4 a. Write a procedure to implement the Cohen Sutherland line clipping algorithm to line clipping for any input pair of line endpoints. **(8)**

b. Explain the terms: **(4+4)**
(i) Curve Clipping
(ii) Interior and exterior clip

Q.5 a. Show that a transformation matrix for a reflection about the line y = x, is equivalent to a reflection relative to the x- axis, followed by a counter clockwise rotation of $90^{\cdot}$ **(6)**

b. Give a brief description of the two dimensional viewing transformation pipeline. Construct the expressions for window to viewport coordinate transformations and explain. **(10)**

Q.6 a. Write a procedure to perform 3-point perspective projection of an object. **(8)**

b. Develop an algorithm for performing constructive solid geometry modelling using a primitive set of solids defined in octree structures. **(8)**

Q.7 a. What is the underlying concept of the Painter's Algorithm for hidden surface removal? Identify two advantages and one disadvantage of the z-buffer algorithm compared to the Painter's algorithm. **(10)**

b. Write a brief note on Specular Reflection. **(6)**

Q.8 a. Using an appropriate diagram to illustrate your answer, describe the principle of a texture mapping technique that uses perturbation of surface normals to create texture effects. **(8)**

b. Using diagrams to illustrate, explain the principle of each of the following anti-aliasing techniques. **(8)**
(i) Area sampling
(ii)Super-sampling

Q.9 a. Explain the characteristics of a Bezier curve. Describe the concept of degree elevation and give its expression. Also explain the variation diminishing property with an example. **(8)**

b. Give a short note on Bezier surface. Give a procedure to construct. a Bezier surface. Give example. **(8)**