ROLL NO. _____

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

AMIETE – CS/IT (Current Scheme)

Time: 3 Hours **JUNE 2015** **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. To store black and white images, black pixels are represented by_____ in the frame buffer and white pixels by_____

(A) Zero and one **(B)** One and Zero
(C) Both **(A)** & **(B)** **(D)** None of these

b. The display controller converts 0s and 1s into_____

(A) TV monitor **(B)** Video signal
(C) Electronics signal **(D)** None of these

c. _____ is the ratio of horizontal points to vertical points necessary to produce equal length lines in both direction.

(A) Dot Pitch **(B)** Resolution
(C) Aspect Ratio **(D)** Height-Width Ratio

d. Beam penetration method is usually used in _____.

(A) LCD **(B)** Raster Scan display
(C) Random scan display **(D)** DVST

e. Graphics and image processing technique used to produce a transformation of one object into another is called

(A) Animation **(B)** Morphing
(C) Half toning **(D)** None of these

f. (2, 4) is a point on a circle that has center at the origin. Which of the following points are also on circle?

(A) (2, –4) **(B)** (–2, 4)
(C) (–4, –2) **(D)** All of these

g. The object refers to the 3D representation through linear, circular or some other representation are called

(A) Quadric surface **(B)** Sweep representation
(C) Torus **(D)** None of these

h. How many data elements for each region in octree data structure?

(A) 2 **(B)** 4
(C) 6 **(D)** 8

i. The_____ combines the volumes occupied by overlapping 3D objects using set operations

(A) Beam penetration **(B)** CSG Method
(C) Sweep representation **(D)** None of these

j. When the polygon surfaces are to be tiled, is used

(A) Polygon net **(B)** Polygon mesh
(C) Polygon block **(D)** Polygon cell

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

Q.2 a. Differentiate between raster and random scan displays. Also differentiate between horizontal and vertical retracing with examples. **(6)**

b. Explain the concept of virtual reality with examples. **(4)**

c. Consider two raster systems with the resolutions of 640 x 480 and 1280 x 1024. How many pixels could be accessed per second in each of these systems by a display controller that refreshes the screen at a rate of 60 frames per second? **(6)**

Q.3 a. Digitize a line from (10, 12) to (15, 15) on a raster screen using Bresenham's straight line algorithm. **(8)**

b. Explain a two-dimensional world-coordinate reference frame in OpenGL. How will you set the window color using OpenGL? **(8)**

Q.4 a. Explain Cyrus-Beck clipping algorithm for a convex polygon with an example. **(8)**

b. Explain various OpenGL point-attribute and OpenGL line attribute functions with examples. **(8)**

Q.5 a. Calculate the new coordinates of a block rotated about x axis by an angle of = 30 degrees. The original coordinates of the block are given relative to the global xyz axis system **(8)**
A(1, 1, 2), B(2, I, 2), C(2, 2, 2), D(1, 2, 2), E(1, 1, 1), F(2, 1, 1), G(2, 2,1), H(1, 2, 1).

b. Derive the transformation matrix for translation and scaling. **(8)**

Q.6 a. Compare the Cohen-Sutherland and Liang-Barsky line clipping algorithms on the basis of their merits and demerits. Explain. **(8)**

b. Explain: **(8)**
(i) Perspective projection of a point
(ii) Perspective projection of a line

Q.7 a. How do you create shading and draw shadows? Explain. **(8)**

b. Discuss the three parameters that OpenGL allows to be set to specify general rules for applying the lighting model. **(8)**

Q.8 a. Explain the steps involved in scan-line polygon fill algorithm. Illustrate with an example. **(8)**

b. Discuss the different approaches to antialiasing. **(8)**

Q.9 a. Discuss the different ways of describing curves by means of Polynomials. **(8)**

b. What are the properties of Bezier curves? Discuss them. **(8)**