ROLL NO. _____

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

AMIETE – CS/IT (Current Scheme)

Time: 3 Hours **JUNE 2017** **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 electron beam in a color picture tube is refreshed_____ times in a second to make video realistic
(A) 15 times **(B)** 25 times
(C) 35 times **(D)** 45 times

b. A line with endpoints codes as 0000 and 0100 is ?
(A) Partially invisible **(B)** Completely visible
(C) Completely invisible **(D)** Trivially invisible

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

d. Choose the incorrect statement from the following about the basic ray tracing technique used in image synthesis ?
(A) In this technique rays are cast from the eye point through every pixel on the screen
(B) In this technique, viewing transformation are not supplied to the scene prior to rendering
(C) This technique removes hidden surfaces.
(D) In this technique rays are cast from the light source to the object in the scene

e. The method which is based on the principle of checking the visibility point at each pixel position on the projection plane are called____.
(A) Object-space method **(B)** Image-space method
(C) Both **(A)** & **(B)** **(D)** None of these

f. Gray scale is used in ?
(A) Monitor that have color capability
(B) Monitor that have no color capability
(C) Random scan display
(D) None of 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 **(B)** Y = -X
(C) X = Y **(D)** X + Y = 1

h. If a line joining any of its two interior points lies completely within it is called
(A) Convex polygon **(B)** Concave polygon
(C) Both **(A)** and **(B)** **(D)** None of these

i. Obliquee projection with an angle of 45° to the horizontal plane is called as?
(A) Cabinet projection **(B)** Isometric projection
(C) Cavalier projection **(D)** None of these

j. In beam penetration method of color CRT, which layer is red and which is green
(A) Outer is red and inner is green **(B)** Inner is red and outer is green
(C) Inner is red or inner is green **(D)** None of these

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

Q.2 a. Write short notes on the following: **(8)**
(i) Beam penetration method
(ii) Direct-View Storage Tubes (DVST)

b. What is frame buffer? Consider a raster system with resolution of 1280×1024. What size of frame buffer is needed for given system to store 24 bits per pixel in kB? **(4)**

c. Compare random and raster display systems. **(4)**

Q.3 a. Find the transformation matrix that transforms the given square ABCD to half its size with center still remaining at the same position. The co-ordinates of the square are A(1,1), B(3,1), C(3,3), D(1,3) and center at (2,2). **(8)**

b. Define window and viewport. Derive the viewing transformation matrix if the lower left window coordinates are (Xw_{min}, Yw_{min}) and upper right window coordinates are (Xw_{max}, Yw_{max}) where as the lower left viewport co-ordinates are (Xv_{min}, Yv_{min}) and upper right viewport coordinates are (Xv_{max}, Yv_{max}). **(8)**

Q.4 a. Use the Cohen-Sutherland line clipping algorithm to clip the line p1(70,20) - p2(100,10) against a window whose lower left corner coordinates are (50,10) and upper right coordinates are (80,40). Also give the region code for the end points of a line before and after clipping. **(8)**

b. A line P(0, 20) – Q(10, 10) is to be clipped against a polygon A(20, 0), B(20, 20), C(10, 20), D(0, 10), E(10, 0), A(20, 0). Using Cyrus-Beck algorithm find the visible portion of the clipping line. **(8)**

Q.5 a. Define Polygonal meshes. What are the different methods used to represent polygon mesh. Give the advantages and disadvantages of polygon mesh. **(8)**

b. Discuss 3D affine transformation with proper example. **(8)**

Q.6 a. Write an OpenGL code to draw a triangle having vertexes at A(100, 100), B(150, 100) and C(125, 50). Briefly explain any 4 functions used in OpenGL. **(8)**

b. Define **(8)**
(i) Regular polygon.
(ii) Pixel
(iii) Resolution
(iv) Interlacing

Q.7 a. What is projection? Derive a transformation matrix for perspective projection. **(8)**

b. Find the mirror reflection transformation with respect to a plane passing through point P(2, 2, 2) and having a normal vector $N = I + J + K$. **(8)**

Q.8 a. Explain painter's algorithm for removing hidden surfaces? **(8)**

b. Explain Phong Shading Model. What are the problems with interpolated shading? Discuss in brief. **(8)**

Q.9 a. What is aliasing? Discuss any one method for antialiasing? **(8)**

b. Given $P_0[1,1]$, $P_1[2,3]$, $P_2[4,3]$ and $P_3[3,1]$ the vertices of a Bezier polygon, determine seven points on the Bezier curve.
Note: Use parametric equations. **(8)**