Code: AC60/AT60 Subject: COMPUTER GRAPHICS

AMIETE – CS/IT (NEW 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. The look up table technique .... the number of intensity levels.

(A) decreases **(B)** increases
(C) removes **(D)** gives no effect on

b. Suppose $(x_1,y_1),(x_2,y_2),........,(x_n,y_n)$ are n vertices of a closed polygon and (x,y) is a point such that x is the less than the minimum of $\{x_1,x_2,......,x_n\}$ then the point (x,y) lies ....the polygon

(A) Inside **(B)** outside
(C) on **(D)** as vertex of

c. If two bits are zeros and two bits are ones in a code of a sub-region in Cohen-Sutherland line clipping algorithm then the sub region is.................

(A) corner region **(B)** middle region
(C) central region **(D)** none of these

d. The line segment should be considered for clipping if

(A) both endpoint codes are 0000.
(B) the logical AND of the end point codes is not 0000.
(C) the logical AND of the end point codes is 0000.
(D) the logical OR of the end point codes is 0000.

e. If we rotate the point P = (3,1,4) through 30^0 about the y-axis, then

(A) the x-coordinate of the point is not altered.
(B) the y-coordinate of the point is not altered.
(C) the z-coordinate of the point is not altered.
(D) none of the above

f. The two dimensional matrix transformation for scaling with "a" units along x-axis and "b" units along y-axis is ....

(A) $\begin{pmatrix} a & 0 & 0 \\ 0 & b & 0 \\ 0 & 0 & 1 \end{pmatrix}$ (B) $\begin{pmatrix} -a & 0 & 0 \\ 0 & -b & 0 \\ 0 & 0 & 1 \end{pmatrix}$

(C) $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ a & -b & 1 \end{pmatrix}$ (D) $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ b & a & 1 \end{pmatrix}$

g. Parallel projection is characterized by the

(A) view plane alone
(B) direction of projection and the view plane
(C) center of projection and the view plane
(D) center of projection alone

h. The z-buffer algorithm

(A) Finds the largest depth value z
(B) Finds the smallest depth value z
(C) Finds the average of the frame buffer
(D) Calculates the intensity at (x,y)

i. The term refers to the plotting of a point in a location, other than its computed location in order to fit the point into the raster

(A) Resolutions **(B)** Overscan
(C) Aliasing **(D)** none of these

j. Two curves are said to be connected at a point with first order continuity if

(A) both curves simply meet at that point
(B) the tangents to both the curves at that point are equal
(C) the curvatures of both the curves at that point are equal
(D) both the curves are of first order

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

Q.2 a. Explain the operation of a color video monitor display system. **(8)**

b. Explain any four types of physical input devices. **(8)**

Q.3 a. Explain the line drawing using moveto( ) and lineto( ). **(8)**

b. Transform a point P(40,30) given in a window (10,100,10,60) corresponding to (w_l, w_r, w_b, w_t) in world coordinate system to a viewport (30,150,30,90) (v_l, v_r, v_b, v_t) on screen. **(8)**

Q.4 a. Let R be the rectangular window whose lower left-hand corner is at L(-3,1) and upper right-hand corner is at R(2,6). Clip the line segments AB and CD where A(-4,2); B(-1,7); C(-1,5) and D(3,8), using cohen-sutherland line clipping algorithm. **(8)**

b. Write the pseudocode for cyrus-beck clipper for a convex polygon, 2-D case. **(8)**

Q.5 a. Develop the necessary transformation to magnify the triangle with vertices A(0,0), B(1,1) and C(5,2) to twice its size while keeping C(5,2) fixed. **(8)**

b. Work out the combined transformation matrix associated with 45^0 rotation about x-axis , followed by a 30^0 rotation about y-axis, followed by a 60^0 rotation about z-axis? **(8)**

Q.6 a. Describe the properties of meshes used for solid modelling. **(8)**

b. Distinguish between the perspective and parallel projections. Describe the oblique projections. **(8)**

Q.7 a. Distinguish between the flat shading and the smooth shading. Explain the two meshes rendered using flat shading. **(8)**

b. What do you understand by the combining light contribution? Explain. **(8)**

Q.8 a. Describe the supersampling technique of antialiasing. **(8)**

b. Describe briefly a technique for filling polygon defined regions. **(8)**

Q.9 a. Given 4 control point P_0, P_1, P_2, P_3 express the Bezier curve parametric equation in terms of t. Show that the starting slope of the curve is parallel to line P_0, P_1.

What do you understand by converse Hull of a Bezier curve? Take 4 points and draw the converse Hull. **(8)**

b. A Bezier curve is specified by following control points:

$P_0(0,0), P_1(10,40), P_2(30,40), P_3(50,0)$. Work out the coordinates of the point corresponding to t = 0.3 and t = 1.

Draw a rough plot of the Bezier curve for the control points specified above. **(8)**