Subject: COMPUTER GRAPHICS

Time: 3 Hours **Max. Marks: 100**

DECEMBER 2010

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 half an hour 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. Aspect ratio of a display device is _____.

(A) the ratio of its area to its height **(B)** the ratio of its height to its area
(C) the ratio of its width to its area **(D)** the ratio of its width to its height

b. A raster image is stored in a computer as _____.

(A) shades **(B)** lines
(C) objects **(D)** an array of numerical values

c. OpenGL is well suited for _____.

(A) 2D drawings **(B)** simple 3D drawings
(C) complex 3D scenes **(D)** line drawings

d. A _____ for a curve produces different points on the curve, based on the value of a parameter.

(A) curvature form **(B)** implicit form
(C) parametric form **(D)** complex form

e. The Cohen-Sutherland algorithm quickly detects and dispenses with two common cases called _____.

(A) cohen and sutherland **(B)** trivial accept and trivial reject
(C) divide and conquer **(D)** none of these

f. The process of applying several transformations in succession to form one overall transformation is called _____.

(A) viewport transformations **(B)** window transformations
(C) concatenating the transformations **(D)** arbitrary transformations

g. In _____ projection, all three principal axes are foreshortened equal

(A) isometric **(B)** dimetric
(C) trimetric **(D)** metric

h. _____ are more mirror-like and are highly directional.

(A) Diffuse refractions **(B)** Diffuse reflections
(C) Specular reflections **(D)** Diffuse scattering

i. The _____ operation is known as BitBLT.

(A) bit boundary block transfer **(B)** bit black transfer
(C) bit transfer **(D)** bit transformation

j. _____ continuity is a more relaxed form of continuity that describes the visual smoothness of a curve.

(A) Parametric **(B)** Linear
(C) Visual **(D)** Geometric

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

Q.2 a. What are output primitives? Explain one useful categorization of these. **(10)**

b. Explain how an image is created and displayed in computer with raster display. **(6)**

Q.3 a. Explain the five functions that initialize and display the screen window in which the OpenGL program will produce graphics. **(10)**

b. What is the implicit form that describes the shape of a curve? What is the benefit of using the implicit form? **(6)**

Q.4 a. Write the pseudo code for Cohen-Sutherland line clipper. **(8)**

b. Discuss the different cases of Sutherland-Hodgman Polygon Clipping algorithm. **(8)**

Q.5 a. Build a transformation that rotates through 45 degrees, then scales in x by 1.5 and in y by -2, and, finally, translates through (3, 5). Find the image under this transformation of the point (1, 2). **(10)**

b. Write the three matrices that represent transformations that rotate points through an angle θ about x-axis, y-axis, and z-axis. **(6)**

Q.6 a. Consider the polygon with vertices $P_0 = (6, 1, 4)$, $P_1 = (7, 0, 9)$, and $P_2 = ($ 2).Find the normal to this polygon using simple approach. What are t problems with this simple approach? How do you solve these problems? **(8)**

b. Discuss the different types of orthographic projections. **(8)**

Q.7 a. What is diffuse scattering? **(6)**

b. What is Mach band in connection with flat shading? **(6)**

c. What is depth buffer algorithm? **(4)**

Q.8 a. Discuss the usefulness of combining two pixmaps. Explain how you can copy a pixmap from one section of memory to another. **(8)**

b. What is aliasing? Briefly discuss the commonly used antialiasing techniques. **(8)**

Q.9 a. What is the de Casteljau algorithm? **(4)**

b. Write the parametric form of Bezier curve based on four points. Discuss its properties. **(12)**