

**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.

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**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

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g. In \_\_\_\_\_ projection, all three principal axes are foreshortened equally.

- (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

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

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- 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  $\theta$  about x-axis, y-axis, and z-axis. (6)

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- Q.6** a. Consider the polygon with vertices  $P_0 = (6, 1, 4)$ ,  $P_1 = (7, 0, 9)$ , and  $P_2 = (1, 1, 2)$ . Find the normal to this polygon using simple approach. What are the 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)