

Time: 3 Hours

DECEMBER 2015

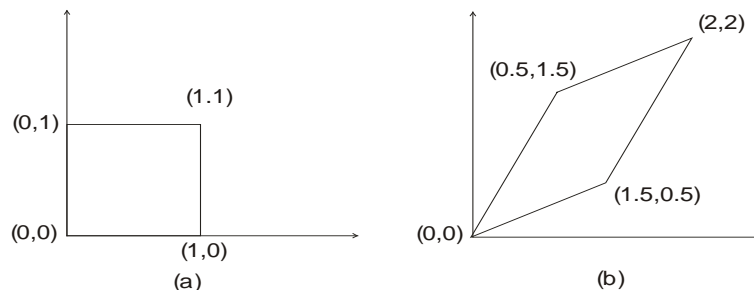
Max. Marks: 100

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE:

- Question 1 is compulsory and carries 28 marks. Answer any FOUR questions from the rest. Marks are indicated against each question.
- Parts of a question should be answered at the same place.

- Q.1**
- Computer graphics has enhanced the quality of work in many areas. Support this statement through a brief discussion on areas of application of computer graphics. Specify at least one specific application.
 - While drawing a circle, co-ordinates of only one eighth of the total pixels lying on circumference of a circle are computed. Why?
 - As a part of graphics design application, you are supposed to eliminate the hidden surfaces in your design. You have an option of choosing either the Z-Buffer technique or the Painters algorithm. Which algorithm will you choose for depth calculation at each pixel on a scan line can be done incrementally if the plane equation for each polygon is available?
 - In depth sorting method, indicate the tests that are to be carried out to determine if two surfaces R and S need not be ordered.
 - A square shown in (a) is converted to a parallelogram shown in (b) using composite transformation matrix M. Determine M.

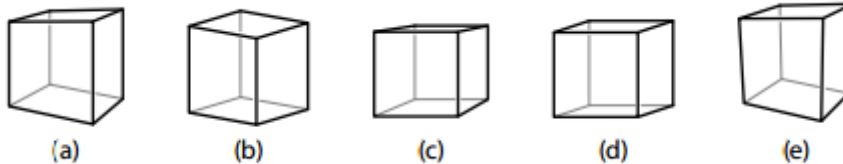


- How will you generate RGB Colour Cube
- Briefly describe following OpenGL functions and their application:

(i) glutInit()	(ii) GL_LINE_STRIP()
(iii) gluInitDisplayMode()	(iv) glOrtho()

(7×4)

- Q.2** a. Explain the midpoint circle drawing algorithm. Illustrate the algorithm, assuming radius equal to 10 cm and the Centre of the circle at origin. (10)
- b. Consider a line from (0, 0) to (4, 6). Rasterize this line using simple DDA algorithm. (8)
- Q.3.** a. Find the homogeneous matrix that transforms the 2D vertices of object A to the corresponding vertices of object B. Express the matrix as a composition of elementary transformations namely translation, scaling and rotation. (6)
- b. Translate the rectangle (2,2), (2,8), (10,8), (10,2) 2 units along x-axis and 3 units along y-axis. (6)
- c. Consider following line drawings of different views of a cube.



Classify the views based on projections: parallel projection, one-point perspective, two-point perspective, or three-point perspective. (6)

- Q.4** a. What is the Parametric Sweeping? Give the derivation of solving any point on the surface using Bezier curve. (12)
- b. Distinguish between Bezier Surface and B-Spline Surface. (4)
- c. Define the applications of Bilinear surfaces. (2)
- Q.5** a. What are the various types of 3D transformations? Explain each briefly. (12)
- b. How do we perform the perspective projection from eye space into screen space? (6)
- Q.6** a. How visible surface determination is done? Explain the painter's algorithm for detecting combined object and image space. (10)
- b. What is Gouraud shading? Explain it with an example. What are its drawbacks? (8)
- Q.7** a. What is random midpoint displacement method? Explain with an example. (10)
- b. Explain the concept of simulating accelerations in animation. (4)
- c. Write a short note on Self Similar fractals. (4)