Sixth Semester B.E. Degree Examination, May/June 2010
Computer Graphics and Visualization

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1 a. Discuss the applications of computer graphics.   (04 Marks)
   b. Giving the block diagram, explain the high-level view of a graphics system.   (06 Marks)
   c. Explain the different graphics architectures.   (06 Marks)
   d. Write a fragment of a simple program in pen plotter model that would generate the output
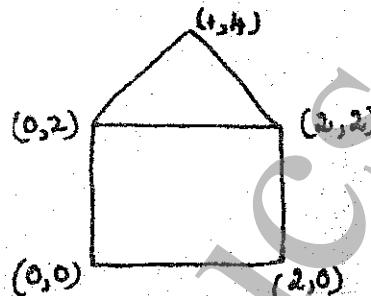   shown in Fig.Q1(d).   (04 Marks)

Fig.Q1(d)

2 a. Write a typical main function that works for moot non-interactive applications and explain
      each function call in it.   (10 Marks)
   b. Explain the major groups of graphics functions.   (07 Marks)
   c. Differentiate additive color model from subtractive color model.   (03 Marks)

3 a. What are the major characteristics that describe the logical behaviour of an input device?
      Explain how open GL provides the functionality of each of the classes of logical input
      devices.   (08 Marks)
   b. What is a display list? Give the open GL code segment that generates a display list defining
      a red triangle with vertices at (50, 50), (150, 50) and (100, 150).   (07 Marks)
   c. What is double buffering? How is it implemented in open GL?   (05 Marks)

4 a. Explain the different open GL frames.   (07 Marks)
   b. Explain bilinear interpolation method of assigning colors to points inside a quadrilateral.
                                                                                            (06 Marks)
   c. Explain the properties that ensure that a polygon will be displayed correctly.   (03 Marks)
   d. Explain the following: (04 Marks)
      i) Point-vector addition   ii) Homogeneous coordinates.

PART – B

5 a. Explain the basic transformations in 3D and represent them in matrix form.   (07 Marks)
   b. What are the entities required to perform a rotation? Show that two rotations about the same
      axis commute.   (07 Marks)
   c. What is concatenation? How does it affect the efficiency of transformations?   (04 Marks)
   d. What are the advantages of quaternions?   (02 Marks)

6 a. Bring out the differences between perspective and parallel projections. **(07 Marks)**
   b. Derive the simple perspective projection matrix. **(05 Marks)**
   c. What is projection normalization? **(03 Marks)**
   d. Explain the z – buffer algorithm giving its pseudo code. **(05 Marks)**

7 a. What are the various methods available for shading a polygonal mesh? **(07 Marks)**
   b. Write the open GL code segment to approximate a sphere using subdivision. **(05 Marks)**
   c. Explain the different types of light sources supported by open GL. **(08 Marks)**

8 a. Use the Liang Barsky line – clipping algorithm to clip the line $P_1(-15, -30)$ to $P_2(30, 60)$ against the window having diagonally opposite corners at $(0, 0)$ and $(15, 15)$. **(07 Marks)**
   b. Digitize the line from $(10, 16)$ to $(16, 12)$ using the DDA algorithm. **(06 Marks)**
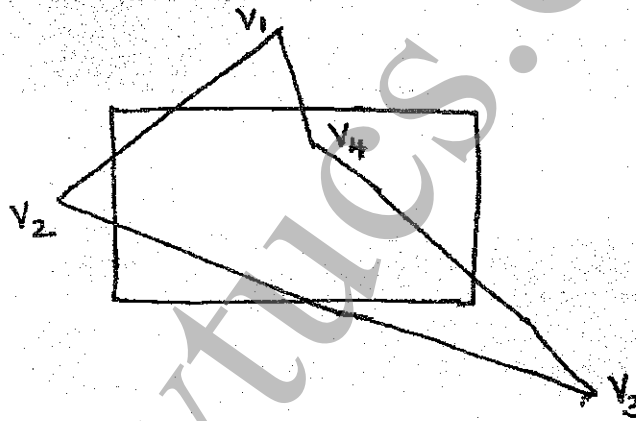   c. Clip the polygon given in Fig.Q8(c) using the Sutherland Hodgeman polygon clipping algorithm. **(07 Marks)**

Fig.Q8(c)

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Sixth Semester B.E. Degree Examination, December 2010
Computer Graphics and Visualization

Time: 3 hrs.

Max. Marks:100

Note: *Answer any FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1   a.   With a neat block diagram, explain the graphics pipeline architecture.   **(12 Marks)**
    b.   Explain the elements of a graphics system, with a neat diagram.   **(08 Marks)**

2   a.   What are the graphics functions which give good API support?   **(10 Marks)**
    b.   Write the different openGL primitives, with example for each primitive.   **(10 Marks)**

3   a.   Write a note on input mode.   **(10 Marks)**
    b.   Explain how an event driven input can be programmed for a keyboard device.   **(05 Marks)**
    c.   Explain how an event driven input can be performed for window events.   **(05 Marks)**

4   a.   Explain rotation, transformation and scaling, with respect to 2-dimensions.   **(08 Marks)**
    b.   Explain the complete procedure of converting a world object frame into camera frame, using the model view matrix.   **(12 Marks)**

PART – B

5   a.   Explain how quaternions are used in rotation in a three-dimension space.   **(10 Marks)**
    b.   Write a program rotating cube, with viewer movement.   **(10 Marks)**

6   a.   What are the simple projections? Obtain the 4×4 matrix representing simple projection.   **(10 Marks)**
    b.   Explain the different classical views, with neat diagrams.   **(10 Marks)**

7   a.   Describe the Phong lighting model. Also, indicate advantages and disadvantages.   **(10 Marks)**
    b.   Explain the classification of light material interactions, in openGL.   **(10 Marks)**

8   Write short notes on:
    a.   Hidden surface removal
    b.   Antialiasing
    c.   Rasterigation
    d.   Cohen-Sutherland line clipping.   **(20 Marks)**

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