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P.E.S. College of Engineering, Mandya - 571 401
 (An Autonomous Institution affiliated to VTU, Belgaum)
Sixth Semester, B.E. - Computer Science and Engineering
Semester End Examination; June/July - 2015
Computer Graphics and Visualization

Time: 3 hrs

Max. Marks: 100

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

PART - A

- 1 a. Explain the four major application areas of computer graphics. 6
- b. Explain the concept of pinhole camera. Derive the expression for an angle of view. Also list the advantages and disadvantages of this. 7
- c. With a neat block diagram describe the 2 main graphics architectures. 7
- 2 a. Write open GL code to display the following Fig. 2a. 6

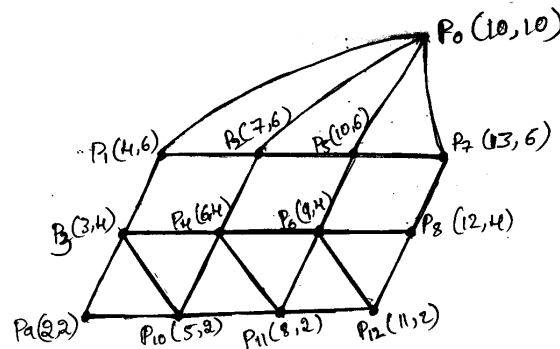


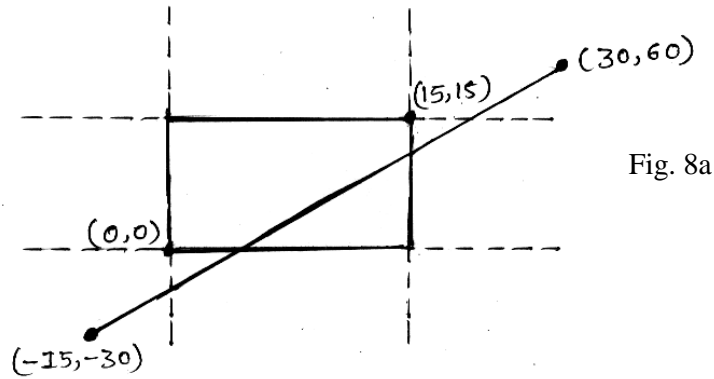
Fig. 2a

- b. List and explain the control functions supported by Open GL. 6
- c. Write an Open GL program to generate a 3D Sierpinski gasket of 5000 points. Indicate the assumptions made in generating the above. 8
- 3 a. Write the 2 major characteristics that describe the logical behavior of an input device. List and explain the various classes of logical input devices that are supported by Open GL. 7
- b. List and explain the types of modes by which an application program can obtain the measure of a device. 8
- c. Define picking. Write down the steps to perform picking. 5
- 4 a. List and explain the various frames of open GL. 6
- b. Explain the bilinear interpolation method for assigning colors to the points inside a polygon. 6
- c. Write an open GL program for Rotating cube with vertex arrays. 8

PART - B

- 5 a. Derive the matrices for the 3-important affine transformations in homogeneous co-ordinates for a point p where $p = (x, y, z)$. 7
- b. Explain how rotation about an arbitrary axis is achieved. 8
- c. Explain how quaternions are used in rotations in a 3- dimensional space. 5

- 6 a. Explain classical viewing and perspective viewing with example. 10
- b. Explain the Z-buffer algorithm. 5
- c. Derive the simple perspective projection matrix. 5
- 7 a. Explain the basic types of light sources in computer graphics. 8
- b. List and explain the types of light-material interactions. 4
- c. Describe the Phong lighting model. Also write its advantages and disadvantages. 8
- 8 a. Use Cohen Sutherland algorithm to clip the line shown in the Fig. 8a. $P_1(-15, -30)$ to $P_2(30, 60)$ against the window having diagonals opposite corners at $(0, 0)$ and $(15, 15)$.



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- b. Explain the following algorithms :
 - i) DDA algorithm
 - ii) Bresenhanis line rasterization

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