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**Third Semester MCA Degree Examination, Dec.2017/Jan.2018**  
**Computer Graphics**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions.**

- 1
  - a. Write a program to display a line segment without using line drawing algorithms and explain the purpose of each statement. (10 Marks)
  - b. Explain open GL point functions and line functions briefly with examples. (07 Marks)
  - c. What are screen coordinates? (03 Marks)
- 2
  - a. Write Bresenham's line drawing algorithm. Trace the algorithm to draw a line with endpoints (-25, -20) to (-17, -16). (10 Marks)
  - b. Write a program to create a wireframe mode of globe using equation of ellipse. (06 Marks)
  - c. Explain the flood-fill algorithm in brief. (04 Marks)
- 3
  - a. Explain two dimensional translation, scaling, rotation and reflection transformations. (09 Marks)
  - b. What is composite transformation? Show that the composition of two rotations is additive and two scaling is multiplicative by concatenating the matrix representations for  $R(\theta_1)$ ,  $R(\theta_2)$  and  $(S_{x_1}, S_{y_1})$ ,  $(S_{x_2}, S_{y_2})$ . (06 Marks)
  - c. Explain general two-dimensional fixed point scaling. (05 Marks)
- 4
  - a. Explain the OpenGL geometric transformation functions and OpenGL matrix operations. (09 Marks)
  - b. Explain the transformation steps for obtaining a composite matrix for rotation about an arbitrary axis. (05 Marks)
  - c. Explain 3-dimensional reflections and shearing transformations. (06 Marks)
- 5
  - a. Explain the terms window and viewport. Using window-to-viewport transformation map a point (xw, yw) in window to a point (xv, yv) in the viewport. (07 Marks)
  - b. Explain Sutherland-Hodgman polygon clipping with an example. (08 Marks)
  - c. Explain text clipping. (05 Marks)
- 6
  - a. Define view plane, projection plane and view-plane normal vector in 3-dimensional viewing. (06 Marks)
  - b. Explain the 3-dimensional transformation pipeline. (04 Marks)
  - c. Explain the 3-dimensional transformation matrices from world to viewing co-ordinate. (08 Marks)
  - d. What are the techniques used to clarify the depth relationships in a wire-frame display other than depth culling? (02 Marks)
- 7
  - a. Explain the orthogonal projection and derive the transformation matrix. (10 Marks)
  - b. Explain perspective projections. (05 Marks)
  - c. Explain the normalization transformation for an oblique parallel projection. (05 Marks)
- 8
  - a. What is Bezier spline curve? Explain the properties of Bezier curves. (08 Marks)
  - b. What is computer animation? Explain the basic approach to design an animation sequence. (06 Marks)
  - c. Write short notes on:
    - (i) Traditional animation technique.
    - (ii) Double buffering. (06 Marks)

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