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B. Tech 3rd Semester Examination

Computer Graphics (O.S.)

IT-3004

Time : 3 Hours   **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all. Selecting one question from Sections A, B, C and D. Section E is compulsory.

SECTION - A

1. (a) Explain how virtual reality systems can be used in design application. List the different input and output components that are typically used with virtual reality systems. Also explain how user interacts with a virtual scene displayed with different output device, such as 2-Dimensional and stereoscopic monitors.   **(10)**

    (b) Explain and differentiate the construction of the Raster-refresh device and Vector-refresh device with suitable block diagram and their operating characteristics.   **(10)**

2. (a) Explain the term computer graphics with its types. Name the important applications of computer graphics and the major parts of a computer graphics system and briefly describe the function of each.   **(10)**

    (b) Name five types of logical input devices and for each name a physical input device that can be used to provide the corresponding logical input data.   **(10)**

SECTION - B

3. (a) What is Scan Conversion? Explain scan conversion algorithms for ellipse. What are the three major adverse side effects of scan conversion?   **(10)**

    (b) Give a 3×3 homogeneous matrix to rotate the image clockwise by 90°. Then shift the image to the right by 10 units. Finally scale the image by twice as large. All these transformations are to be done one after another in sequence.   **(10)**

4. (a) Derive the 2-Dimensional transformation that rotates an object point θ° about the origin; write the matrix representation for this rotation.   **(10)**

    (b) Express a simultaneous shearing in terms of rotation and scaling transformations in 2-Dimesional transformation with example.   **(10)**

SECTION - C

5. (a) What do you understand by the term clipping? Explain different types of clipping with examples. How polygon clipping is done using the line clipping algorithms?   **(10)**

    (b) Explain and formulate the scan-line algorithms with example.   **(10)**

6. (a) What is the need of removing Hidden Surfaces? Explain all the algorithms related to hidden surface with mathematical formulation and diagram.   **(10)**

    (b) What is Projection? State and explain different types of projection with its mathematical formulation and diagram.   **(10)**

SECTION - D

7. (a) Explain the Shading Model. What is the difference between the Y in CMY and the Y in YIQ? Why everything looks gray or black in a dark room where we can barely see? **(10)**

   (b) Write short note on the following:

      (i) Reflection and Refraction

      (ii) Lambert's Cosine Law **(2×5=10)**

8. (a) What is Animation? What are the different types, method and applications of controlling the animation? What do you understand by Animation Language? Explain Kinematics of controlling Animation. **(10)**

   (b) What is Key-Frame System? Explain different techniques of key-frame with example. **(10)**

SECTION - E

9. Attempt all Parts:

   (a) Describe briefly Bresenham's circle drawing algorithm. Why do we prefer incremental algorithm over DDA?

   (b) Differentiate between Computer graphics and image processing.

   (c) Describe the operations for CSG modeling in computer graphics.

   (d) Formulate transformation matrices for scaling relative to any fixed point (x, y) and 3-Dimensioal object.

   (e) What is frame buffer? What are Bitmap and Fixmap?

[P.T.O.]

(f)   Name the material used for coating screen in CRT and why?

(g)   What are the various types of interpolation used in animation?

(h)   Differentiate between parallel and perspective projections.

(i)   What is B-Spline? How is periodic B-Spline curve different from non-periodic B-Spline curves?

(j)   The direct coding method is flexible in that it allows the allocation of a different number of bits to each primary color. If we use 5 bits each for red and blue and 6 bits for green for a total of 16 bits per pixel, how many possible simultaneous color do we have?   **(2×10=20)**