CBCS SCHEME

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21CS63

Sixth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Computer Graphics and Fundamentals of Image Processing

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain any five of the applications of computer graphics. **(06 Marks)**

b. Develop the Bresenham's line drawing algorithm. Apply this algorithm for the line end points (20, 10) and (30, 18), list the points and plot the resultant line in x-y plane. **(09 Marks)**

c. Explain OpenGL point and line functions with examples. **(05 Marks)**

OR

2 a. Explain the raster scan with neat diagram. Explain the role of the graphic controller. **(06 Marks)**

b. Explain OpenGL functions to draw point, line and polygon objects in 2D. Develop the code snippet for drawing object star shape in 2D. **(09 Marks)**

c. Illustrate the display window management using GLUT with diagram. **(05 Marks)**

Module-2

3 a. Explain the equation and matrix representation for a 2D object translation and rotation about the origin with the neat diagram. **(08 Marks)**

b. With neat diagram, explain the 3D translation of a point and extend the same for 3D object. Write the equations for each vertex and matrix representation. **(10 Marks)**

c. Justify the need of homogeneous coordinates. **(02 Marks)**

OR

4 a. Explain with the diagram the 3D object rotations and scaling. Give the matrix representations of the object. **(08 Marks)**

b. Illustrate with neat diagram, the five steps sequence of transformations for rotating an 3D object about an axis parallel to the x-axis. **(10 Marks)**

c. Define 2D reflection and shear. **(02 Marks)**

Module-3

5 a. Explain the LOCATOR, STROKE, VALUATOR, CHOICE and STRING Logical Input Devices. **(08 Marks)**

b. Explain the basic approach to the design of animation sequences. **(07 Marks)**

c. Explain the GLUT mouse functions with a program snippet. **(05 Marks)**

OR

6 a. Explain any three interactive picture-construction techniques with necessary diagram. **(08 Marks)**

b. Explain the traditional animation techniques with bouncing-ball illustration. **(07 Marks)**

c. Explain the GLUT keyboard functions with a program snippet. **(05 Marks)**

Module-4

7 a. Explain image processing and its related fields in detail. **(10 Marks)**

b. Define pixel, resolution and its bit-depth of an image. Explain the digital image representation in the computer system with neat diagram. **(08 Marks)**

c. An image of size 2.5 inches by 2 inches is scanned at 150 dpi. Determine the number of pixels in the image. **(02 Marks)**

OR

8 a. Explain the fundamental steps in image procesing with diagram. **(07 Marks)**

b. Explain the following terms or concepts with suitable examples with respect to pixels in an image:
(i) Neighbourhood (ii) Connectivity (iii) Relations **(11 Marks)**

c. Consider a 375 × 300 grey-scale image needs to be sent across the channel of capacity 28 Kbps, then determine the transmission time requied. **(02 Marks)**

Module-5

9 a. Define image segmentation. Explain the classification of the segmentation algorithms. **(10 Marks)**

b. Explain the following grey level discontinuities in a digital image:
(i) Point detection (ii) Line detection **(10 Marks)**

OR

10 a. Explain edge detection and different stages in edge detection process. **(10 Marks)**

b. Explain the following:
(i) Sobel operator (ii) Canny edge detection **(10 Marks)**

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