

CBCS SCHEME

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 processing 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 required. (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)
