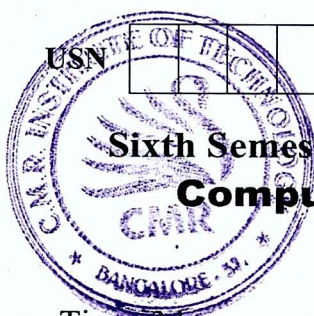


CBCS SCHEME

21CS63



Sixth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026

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 with neat diagram operations of cathode ray tube. (05 Marks)
- b. What is Computer Graphics? Explain the applications of computer graphics with appropriate examples. (05 Marks)
- c. Write Bresenham's line drawing algorithm using Bresenham's algorithm, calculate the pixel positions of the screen coordinates (1, 1) and (6, 7). (10 Marks)

OR

- 2 a. Explain with the help of a neat diagram, operations of shadow mask CRT. (05 Marks)
- b. Compare and contrast Raster and Random scan displays with suitable figure. (05 Marks)
- c. Describe the basic structure of OpenGL graphics program with necessary OpenGL functions. (10 Marks)

Module-2

- 3 a. Develop a composite homogeneous transformations matrix to scale the objects along the X and Y directions. (05 Marks)
- b. Discuss the OpenGL functions for the following 3D transformations:
i) Translation ii) Scaling iii) Rotation (05 Marks)
- c. Explain the following considering 2D:
i) Rotation about fixed point
ii) Scaling about fixed point (10 Marks)

OR

- 4 a. Explain shear and reflection transformation techniques for 2D. (05 Marks)
- b. Explain rotation of a 3D object about an axis parallel to one of the coordinate axis. (05 Marks)
- c. Explain homogeneous coordinate system along with translation, rotation and scaling in 2D homogeneous coordinate systems with matrix representation. (10 Marks)

Module-3

- 5 a. List and explain the various classes of logical input devices that are supported by OpenGL. (05 Marks)
- b. Explain various input modes with suitable diagrams. (05 Marks)
- c. Explain how keyboard, window and mouse events are recognized by GLUT. Provide suitable examples. (10 Marks)

OR

- 6 a. Explain OpenGL animation procedures with examples. (05 Marks)
- b. Explain the interactive picture construction techniques. (05 Marks)
- c. Write a program that plots a red point size equal to 3 at the position of the mouse cursor in the display window each time that we press the left mouse button. (10 Marks)

Module-4

- 7 a. Explain image processing environment with the help of a neat diagram. (05 Marks)
- b. List and explain image processing and other closely related fields. (05 Marks)
- c. Calculate the entropy of the given image :

1	2	3	5
3	4	4	6
9	9	8	7
1	3	5	6

(10 Marks)

OR

- 8 a. Define Digital Image Processing. With a neat diagram explain the fundamental steps of image processing. (10 Marks)
- b. Consider the following two images and perform addition, subtraction, multiplication and division. Assume both images are 8-bit integer type.

$$F = \begin{bmatrix} 1 & 3 & 7 \\ 5 & 15 & 75 \\ 200 & 50 & 150 \end{bmatrix}$$

$$G = \begin{bmatrix} 50 & 150 & 125 \\ 45 & 55 & 155 \\ 200 & 50 & 75 \end{bmatrix}$$

(10 Marks)

Module-5

- 9 a. Explain Image Segmentation and the formal definition of image segmentation. List and explain classification of segmentation algorithms. (10 Marks)
- b. What is Edge Detection? With an example explain Roberts operator and Sobel operator. (10 Marks)

OR

- 10 a. Discuss Laplacian and Canny edge detection. (10 Marks)
- b. What are the 3 basic types of gray level discontinuities? Explain line detection. (10 Marks)
