



CBCS SCHEME

21EC732

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Seventh Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Digital Image Processing

Max. Marks: 100

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

Module-1

- 1 a. What is Digital Image Processing? Explain the fundamental steps in image processing with neat block diagram. (10 Marks)
- b. Explain the components of an Image Processing System. (10 Marks)

OR

- 2 a. Describe the Image sensing and acquisition process. (10 Marks)
- b. Explain 4, 8 and m adjacency with an example. (06 Marks)
- c. Discuss Image Sampling and Quantization. (04 Marks)

Module-2

- 3 a. Define forward and inverse 2D Fourier transform in detail. Prove any two properties. (06 Marks)
- b. Check whether the matrix $A = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix}$ is unitary or not. (04 Marks)
- c. Compute Discrete Cosine Transform for $N = 4$. (10 Marks)

OR

- 4 a. Derive the algorithmic steps for Haar Transform. (10 Marks)
- b. Explain KL transform with necessary equations. (10 Marks)

Module-3

- 5 a. Define Histogram. Discuss histogram equalization used in image enhancement. (10 Marks)
- b. Perform histogram equalization for the given image.

| | | | | | | | | |
|---------------|-----|------|-----|-----|-----|-----|-----|----|
| Gray level | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| No. of pixels | 790 | 1023 | 850 | 656 | 329 | 245 | 122 | 81 |

(10 Marks)

OR

- 6 a. Discuss the basic intensity transformation functions. (10 Marks)
- b. Explain the smoothing filters in the spatial domain. (10 Marks)

Module-4

- 7 a. Discuss the filters used to sharpen an image in frequency domain. (10 Marks)
- b. What is the function of a color model? How the HSI model is converted to RGB model? Explain. (10 Marks)

OR

- 8 a. What is Pseudocolor Image Processing? Explain intensity slicing in pseudocolor image processing. (10 Marks)
- b. Write a short note on Homomorphic Filtering. (10 Marks)

Module-5

- 9 a. Draw the Image Degradation Model. (04 Marks)
- b. Explain the concept of inverse filtering. (06 Marks)
- c. Explain the following :
 (i) Median filter
 (ii) Alpha trimmed mean filter
 (iii) Max and min filters (10 Marks)

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OR

- 10 a. Derive the expression for mean square error using Wiener filter. (10 Marks)
- b. Discuss the different types of noise models with their probability density functions. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8=50, will be treated as malpractice.