USN

21EC753

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Basic Digital 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. With a block diagram explain the fundamental steps involved in digital image processing. **(10 Marks)**

b. Briefly explain the following with examples :
   i. 4 – adjacency
   ii. 8 – adjacency
   iii. m – adjacency
   iv. Euclidean distance
   v. City –block distance. **(10 Marks)**

OR

2 a. Briefly explain the elements of visual perception. **(10 Marks)**

b. Explain the image acquisition using sensor strips and sensor arrays. **(10 Marks)**

Module-2

3 a. Briefly explain the following intensity transformation functions with necessary graphs.
   i. Image negatives
   ii. Log transformations
   iii. Power-law transformations. **(10 Marks)**

b. Define histogram. What is histogram equalization, and how this method is used to enhance the image. **(10 Marks)**

OR

4 a. Write a note on image sharpening in the spatial domain. **(10 Marks)**

b. Explain the smoothing filters in spatial domain for image enhancement. **(10 Marks)**

Module-3

5 a. Briefly explain the steps involved for filtering an image in the frequency domain. **(10 Marks)**

b. Explain in brief the following frequency domain image smoothing techniques.
   i. Ideal low pass filters
   ii. Butterworth low pass filters. **(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.

OR

6 a. Briefly explain image sharpening using frequency domain filters. **(10 Marks)**
b. Illustrate Homomorphic filtering in image enhancement in frequency domain. **(10 Marks)**

Module-4

7 a. Explain RGB and HSI color models. **(10 Marks)**
b. Explain the concept of pseudo color image processing. **(10 Marks)**

OR

8 a. Using necessary equations explain the process of converting RGB to test color model and HSI to RGB color model. **(10 Marks)**
b. With a neat sketch, explain Color chromaticity diagram. **(10 Marks)**

Module-5

9 a. With the help of block diagram, explain the image Degradation/Restoration process. **(10 Marks)**
b. Discuss the different noise models with their Probability Density Functions(PDF). **(10 Marks)**

OR

10 a. Assuming the presence of noise only, explain the following mean filters
i. Arithmetic mean filter
ii. Geometric mean filter
iii. Harmonic mean filter
iv. Contra harmonic mean filter. **(10 Marks)**
b. What are adaptive filter? Explain in brief adaptive median filtering method. **(10 Marks)**

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