

Time: 3 HRS

Max. Marks: 80

- N.B.:** 1) Question No.1 is **compulsory**.
 2) Attempt any **three** from the remaining **five** questions.
 3) Figures to the right indicate full marks

Q.1 20

(Attempt **any FOUR**. Each question carries 5 marks)

- Differentiate between brightness, contrast, hue, and saturation.
- Explain the concept of 2D sampling and quantization.
- Write any two properties of Discrete Fourier Transform (DFT).
- What is impulse noise in digital images? Give an example
- Define dilation and erosion in morphological image processing.

Q.2

- Explain the simple image formation model. Discuss the working principle of a Digital Camera with neat diagram 10
- Perform histogram equalization for an image with intensity levels 0,1,2,30,1,2,30,1,2,3 having frequencies 10,20,40,30,10, 20, 40, 30,10,20,40,30. (Total pixels = 100) 10

Q.3

- Compare spatial and frequency domain filtering. Explain smoothing and sharpening filters. 10
- Apply a 3×3 average filter to the image matrix and show the result. 10

A =

10	20	30
40	50	60
70	80	90

Q.4

- Explain the Discrete Cosine Transform (DCT) and its applications in image compression. 10
 - Explain about edge detection using gradient operator. 10
- 10**

Q.5

- (a) Discuss noise models: Gaussian, uniform, exponential, and salt & pepper
- (b) Describe two image restoration techniques, explaining how they work and when they are used. (Hint: inverse filtering, median filtering) **10**

Q.6

- (a) Construct a Huffman code for symbols A, B, C, D with frequencies 40,30,20,1040, 30, 20, 1040,30,20,10 (total = 100). Compute the average code length. **10**
- (b) Perform dilation and erosion on the binary image matrix using structuring element **10**

A =

0	1	0
1	1	1
0	1	0
