

Bachelor Level / Third Year / Fifth Semester / Science
Computer Science and Information Technology (CSC321)
Image Processing
(NEW COURSE)

Full Marks: 60
Pass Marks: 24
Time: 3 hours.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

Section A

Attempt any TWO questions.

[2×10 = 20]

1. Define linear filter. Given the following histogram of image, stretch to the whole dynamic range using histogram equalization. [2 + 8]

Gray Level	0	1	2	3	4	5	6	7
Frequency	0	25	0	10	35	50	0	0

2. Write expression for forward and inverse Discrete Fourier Transform (DFT) for 2D signal. What are the properties of DFT? [6 + 4]

3. Briefly list any two noise models. From the following probability distribution construct the Huffman Code for each gray level. [3 + 7]

rk	0	1	2	3	4	5
P(rk)	0.4	0.18	0.1	0.25	0.07	0.05

Section B

Attempt any EIGHT questions.

[8 × 5 = 40]

4. Define region and boundary. List some elements of visual perception. [2+3]
5. What are implications of periodicity and symmetry? Discuss about lossless predictive model. [2 + 3]
6. Describe Chain Codes with necessary examples. How can you make chain code rotation and scaling invariant? [2 + 3]
7. How vertical lines and horizontal lines are detected? Illustrate with an example. [5]
8. Write the algorithm for basic global thresholding. [5]
9. How do you represent image in spatial domain? Differentiate between intensity level and bit plane slicing. [2 + 3]
10. What is pattern recognition? Discuss about Mexican Hat Filters. [1.5+3.5]
11. What are the usages of derivative based filters? Derive mask for Laplacian second order derivative based filter. [2 + 3]
12. Show that the points (1,1), (-2,7) and (3,3) are collinear using Hough Transform and find the equation of the line. [5]