RANI RASHMONI GREEN UNIVERSITY

Post Graduate Department of Computer Science
M.Sc. Semester-III Examinations 2025
Subject: Computer Science
Paper: MSCCS301 (Digital Image Processing)

Time: 2 Hours **Full Marks: 40**

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

*Question No. 1 is compulsory and any **five** from the rest.*

1. Answer any **five** (5) questions. 5 x 2 = 10
   (a) Mention the basic components of image processing system.
   (b) What do you mean by sampling and quantization?
   (c) Define the following terms: (i) Compression (ii) Segmentation.
   (d) What is Histogram? Explain with an example.
   (e) Explain two geometric transformation techniques used in image processing.
   (f) Write down two advantages of transforming images from spatial to frequency domain.
   (g) What is the purpose of Contrast stretching in image enhancement techniques?

2. Distinguish between spatial correlation and convolution. Explain each with identical example. 3+3

3. Perform the Histogram Equalization for an 8 x 8 image shown below: 6

Gray levels	0	1	2	3	4	5	6	7
No. of Pixels	9	8	10	5	11	15	3	3

4. Consider the following image given below, calculate the output value of the pixel at (2,2) position if smoothing is done using a 3x3 neighbourhood using all the filters below: 6

   (i) Box/Average filter,
   (ii) Weighted average filter,
   (iii) Median filter,
   (iv) Min filter.

1	8	8	0	7
4	7	9	5	1
5	4	6	6	8
1	4	2	5	9
0	1	0	2	0

5. Compute Discrete Fourier Transform of the sequence f(x) = {1, 0, 0, 1}. 6

6. How to check if two pixels of an image are (i) 4-adjacent (ii) 8-adjacent (iii) m-adjacent. 6

7. Write down the step-by-step process or the algorithm to identify the number of connected components present in an image. 6

8. Explain the following terms: 2+2+2
   (i)Chess board distance,
   (ii) City block distance,
   (iii) Image negative.