

**M.TECH. PRINTING ENGINEERING AND GRAPHIC COMMUNICATION
FIRST YEAR FIRST SEMESTER EXAM 2025**

Subject: DIGITAL IMAGE PROCESSING

Time : 3Hrs.

Full Marks : 100

Answer any 4 questions

1. a) Discuss any two applications of digital image processing in printing and packaging. 4
- b) Briefly discuss the process of converting an analogue image signal to digital signal. 5
- c) How the bit depth limits the image quality? 2
- d) What is the purpose of histogram equalization method? Name few algorithms commonly used for this. 2
- e) Consider following image and apply any 2 histogram equalization methods and list your observations in terms of contrast enhancement attained. 12

172	46	46	83	49	172
83	140	172	140	140	140
83	46	172	46	49	49
83	49	140	36	140	83
172	49	46	46	49	140
83	46	49	140	140	140

2. a) What are the differences between low pass and high pass filters and what are their applications in image processing? 3
- b) Show the development of any high-pass filter in spatial domain. 8
- c) How these filters can be implemented in frequency domain using Fourier transform? 6
- d) What is the purpose of GLCM? Explain its method for any 1 angle for the following image. 8

15	15	100	100
15	15	100	100
15	15	100	100
15	15	100	100

[Turn over

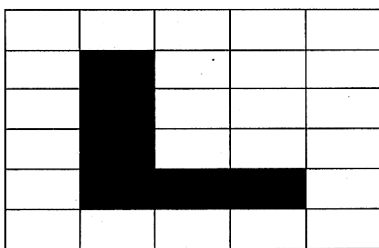
3. a) Write about the types of redundancies that are reduced by compression algorithms. 3
- b) Explain any 2 types of image compression method with the image provided in question number 2d. Draw a brief comparison on the results. 15
- c) Explain the working principle of mean and median filtering and name few applications of those filters. 7
4. a) Briefly write the purpose of image segmentation and any one application in printing and packaging. 3
- b) Describe the principle of Hough transform. 8
- c) What is advantage of adaptive thresholding over fixed thresholding method of segmentation? 2
- c) Describe the principle of adaptive global thresholding and apply the same on the following image. Also note your observations on the resulted segmentation in comparison to fixed thresholding. 12

224	206	94	101	147	49	65	35
241	68	210	146	123	155	230	241
141	233	151	28	12	73	46	11
43	94	142	23	91	167	209	196
45	57	231	137	49	176	139	206
72	70	78	197	201	190	250	219
212	158	192	235	85	118	28	30
71	124	191	41	137	30	116	106

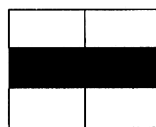
5. a) Why image morphology is used? Name any 2 applications of image morphological operations in printing and packaging. 3
- b) Consider following image (A) and structuring element (B) and perform following morphological operations. Consider black pixels as '1' and white as '0'. 12

i) $(A \oplus B) \ominus B$

ii) $(A \ominus B) \oplus B$



A



B

- c) Consider the following image and represent the shape using normalized chain code. Briefly describe how this method is useful in computer vision. 10

