Ref. No.: Ex/PRN/PC/B/T/423/2024

B.E. PRINTING ENGINEERING FOURTH YEAR SECOND SEMESTER EXAM 2024

Digital Image Processing

Full Marks: 100 **Time: 3 Hrs.**

Please read the instructions carefully and make sure answers of each COs are given separately in one place.

CO 1: Describe the underlying concepts different digital image processing operations (K2)
Answer any 1 question (1 x 25)

1. a) Describe the steps of *jpeg* compression algorithm and also state why it is called lossless compression technique. 15

b) Describe the concept of different paths in digital image processing with suitable examples. 10

2. a) Describe different ordered statistics filtering concepts with suitable example and also state their applications. 15

b) Describe split and merge segmentation algorithm. 10

CO2: Apply the concept and algorithms of digital image processing in given image (K3)

Answer any 1 question (1 x 25)

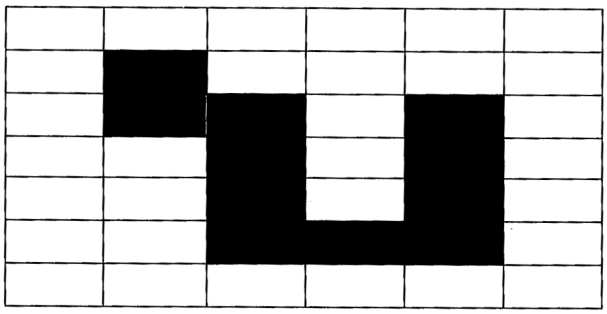
3. a) Apply histogram equalization to the following image and analyze the result. 10

37	40	28	37	25	29	37	40
39	40	39	37	20	20	37	29
20	20	37	37	20	37	20	37
39	40	40	20	37	39	39	20
39	40	39	37	37	20	39	39
20	37	20	20	20	37	20	20
20	37	37	39	39	39	20	39
37	20	37	20	20	39	39	39

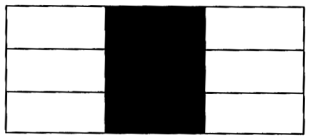
b) Apply the VLC compression on the above image and show amount of compression achieved. 10

c) Apply inverse transform on the above image and list your observation on the result. 5

4. a) Apply closing and opening morphological operations for the given image and structuring element. Also list your observation for each case. 15

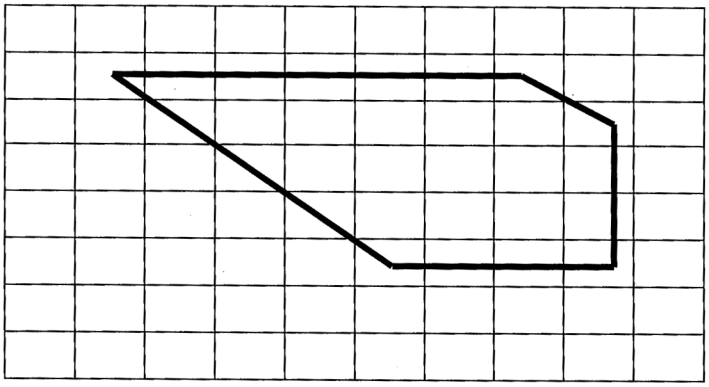


Image



Structuring element

b) Apply chain code to the given shape and find the shape number. Also state how shape number is useful for object identification. 10



CO3: Analyze the requirement of probable image processing operation(s) for given goals (K4)

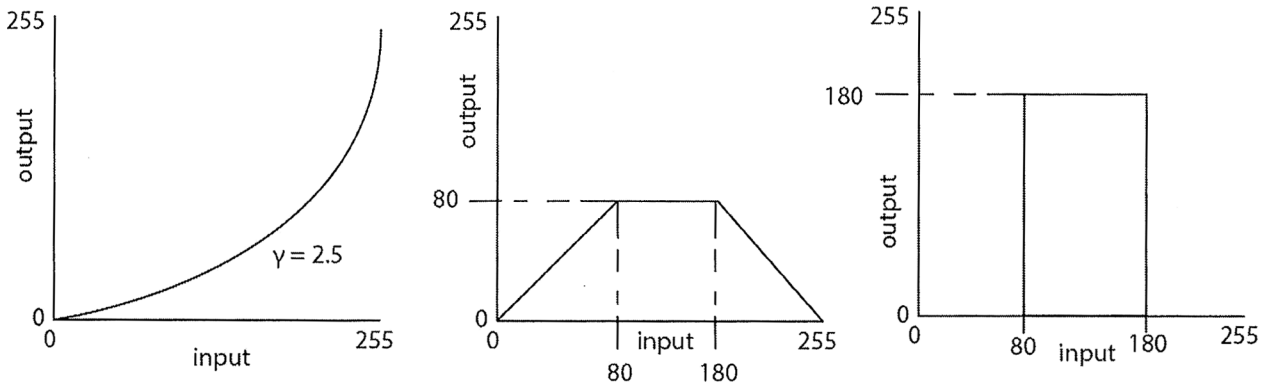
Answer any 1 question (1 x 25)

5. a) Analyze the result of applying unsharp masking on the following image. 12

100	120	200
100	120	200
130	150	210

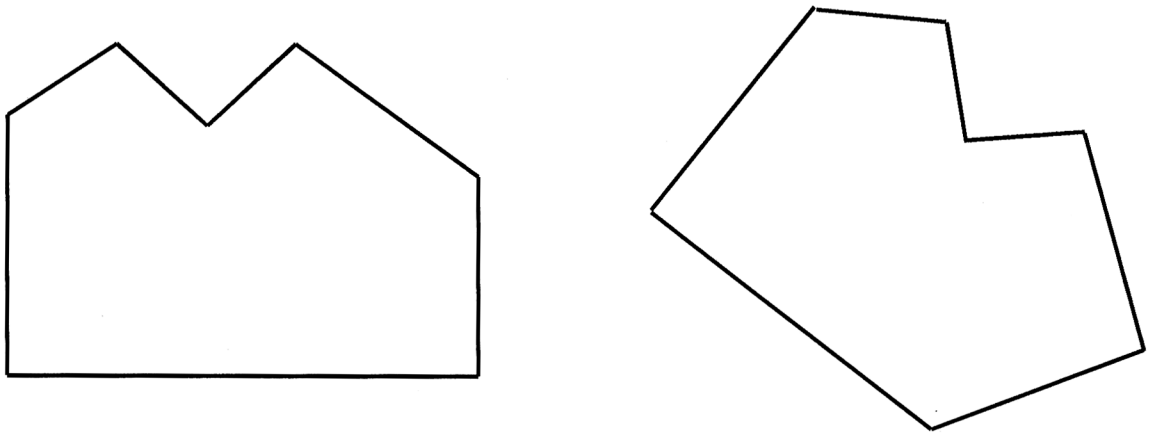
b) Analyze the application of LZW compression on the above image. 13

6. a) Analyze the results of following transforms in image given Q.5(a). 12



Transform 1 Transform 2 Transform 3

b) Analyze the degree of similarity between the given two shapes using shape number. 13



CO 4: Explain the performance of digital image processing operations in the light of different image evaluation measures (K5)

7. Consider the given input and processed images and answer any two questions with justification.

90	130	200
65	200	65
65	200	85

Input image

95	135	210
80	210	80
80	210	70

Output 1

90	130	180
65	180	65
65	180	105

Output 2

a) Which output is better performance in terms of discrete entropy? 12.5

b) Which output is better performance in terms of MSE? 12.5

c) Which output is better performance in terms of AMBE? 12.5