

Max Marks: 80

(4) Assume suitable data, if required and state it clearly.



- [20]

- [10]

- [10]

2	3	5	7
4	6	8	10
1	2	4	8
5	7	9	12

[10]

17	24	1	8	15
23	5	7	14	16
4	6	13	20	22
10	12	19	21	3
11	18	25	2	9

- b Given the following sequence of 8-pixel values from an 8-bit grayscale image: [100, 120, 130, 140, 150, 160, 170, 180]. Outline the process of generating their IGS codes when quantizing to 4 bits per pixel. Show the intermediate steps for all pixels. [10]

Prog. code
1T01136

- 4 a How does Huffman coding achieve optimal lossless compression for a given set of symbol probabilities? Construct the Huffman code for the symbol set {A:0.4, B:0.3, C:0.2, D:0.1}. [10]
- b Suppose you have a binary image representing a handwritten numeral '1' that is several pixels wide. Describe how the thinning operation would process this image. What is the resulting image, and why is thinning useful for character recognition? [10]
- 5 a What is an active vision system, and how does it differ from a passive vision system? Give an example where an active vision system would be preferred over a passive system. How can active vision systems improve depth perception or handle occlusions in a scene? [10]
- b Describe the steps in histogram equalization. Using the histogram data below, calculate the cumulative distribution function (CDF) and use it to find the new intensity levels after equalization. Illustrate the original and equalized histograms. [10]

Intensity Level r_k	0	1	2	3	4	5	6	7
Number of Pixels n_k	55	45	20	25	50	60	70	75

- 6 a How can machine vision algorithms be trained or calibrated to handle variations in paint color and glossiness when grading slates for quality? [10]
- b Given a 4-bit image, consider the intensity transformation function $s = 15 - r$, where r is the original intensity. [10]
- What type of transformation is this?
 - Draw the transformation curve.
 - Apply this transformation to the intensity levels r (0 to 15).
 - Explain the visual effect this transformation would have on an image.


