

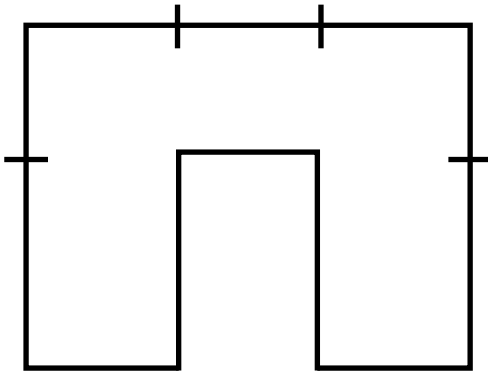
C7-R4 : DIGITAL IMAGE PROCESSING AND COMPUTER VISION

NOTE :
 1. Answer question 1 and any FOUR from questions 2 to 7.
 2. Parts of the same question should be answered together and in the same sequence.

Time: 3 Hours

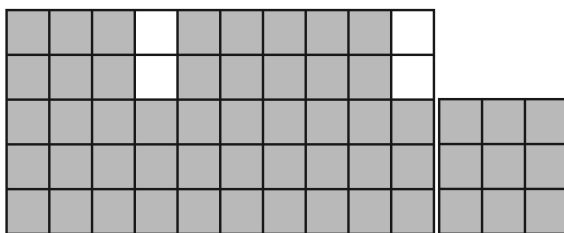
Total Marks: 100

1. (a) List basic components of image processing.
- (b) Define image sampling and image quantization.
- (c) Write equation of x and y in case of orthographic projection and perspective projection.
- (d) Define image pyramid. List different types of image pyramid.
- (e) What is the order of shape number for the figure? Obtain the shape number.



- (f) What is image enhancement? Differentiate spatial domain and frequency domain methods. If I is input intensity and O is output intensity then write the equation for image negation and log transformation. Let intensity range for image is $[0, L-1]$
- (g) Write Sobel mask for horizontal, vertical, -45° , $+45^\circ$. (7x4)

2. (a) Explain contrast stretching. Discuss effect of different possibilities of $(r1, s1)$ and $(r2, s2)$ and plot graph of same.
- (b) List the steps that are followed in JPEG compression.
- (c) If A is image, B is structuring element and $\beta(A)$ is boundary of A , then write the equation for $\beta(A)$. Draw $\beta(A)$ for given A and B .



A B

(8+5+5)

3. (a) Explain Image acquisition using sensor array.
 (b) Explain RGB colour model.
 (c) Draw Huffman tree and obtain code for a, b, c, d, e for following image data
 $A = \{a/20, b/14, c/5, d/10, e/40\}$ where a, b, c, d, and e, are the alphabet and its frequency distribution. (6+6+6)

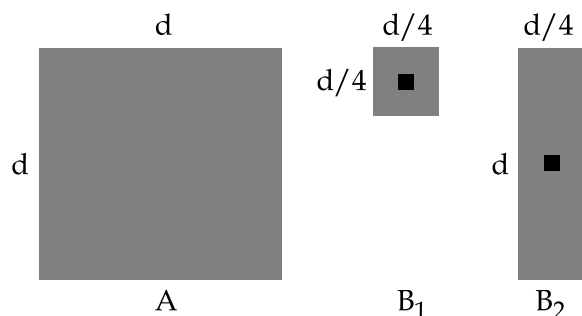
4. (a) Find the equalized histogram for the given histogram and plot both the histograms:

Gray level	0	1	2	3	4	5	6	7
No. of pixel	190	250	210	160	80	60	30	20

- (b) List the methods of shape representation.
 (c) Define the pseudocolor image processing. Explain intensity slicing with respect to it. (8+5+5)
5. (a) Explain erosion and dilation.
 (b) Prepare the LZW encoding table for one line of image having the following intensity values in sequence.
 32 32 34 32 34 32 32 33 32 32 32 34 (8+10)

6. (a) Write the algorithm of Longuet-Higgins Eight-Point Algorithm for Euclidean Structure and Motion from Two Views.
 (b) Write the algorithm for hole filling.
 (c) Write the equation of Haar transformation. Write 4×4 Haar transformation matrix. (8+6+4)

7. (a) The technician performing image enhancement find the following problems (1) bright, isolated dots that are of no interest (2) lack of sharpness (3) not enough contrast (4) shift in the average gray-level value, when this value should be V to perform certain intensity measurement. The technician want to correct these problems and then display in white all gray-levels in the band between I_1 to I_2 while normal tonality in raining gray-level. Propose a sequence of processing steps that technician can follow to achieve a desired task.
 (b) Write equation of erosion A by B where A and B are sets in Z^2 . A , B_1 and B_2 are given in figure. Perform erosion (1) A by B_1 (2) A by B_2 . Given the results for both.



- (c) Explain Minimum Mean Square Error Filtering. (6+6+6)

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