

C7-R4: DIGITAL IMAGE PROCESSING & COMPUTER VISION

NOTE:

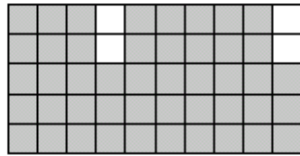
1. Answer question 1 and any FOUR from questions 2 to 7.
2. Parts of the same question should be answered together and in the same sequence.

Time: 3 Hours

Total Marks: 100

1.

- a) Obtain the Haar Matrix for N= 8.
- b) Define blind spot. Show the distribution of rods and cones in human eye.
- c) Compare HSV and HSL Color model.
- d) What will be the shape of histogram for below mentioned images?
 - i) Bright Image
 - ii) Dark image
- e) Performance of a lossy compression technique is based on error criterion. Which are the commonly used objective error criterions?
- f) Differentiate between image enhancement and image restoration process.
- g) Describe Boundary Extraction .Perform boundary extraction on the below given figure:



(7x4)

2.

- a) Explain Sampling and Quantization in Digital Image Processing.
- b) Equalize the given histogram:

Grey Level	0	1	2	3	4	5	6	7
Number of pixels	790	1023	850	656	329	245	122	81

- c) A general gray-level transform can be described as $y = f(x)$ where x is the original pixel value and y is the result after transform. Describe Constant addition and negation transformation. **(8+6+4)**

3.

- a) Consider the symbol and its probability. Encode 'a₁ a₂ a₃ a₃ a₄' sequence

Symbol	a1	a2	a3	a4
Probability	0.2	0.2	0.4	0.2

- b) Define Projective Geometry. Explain its significance in Computer Vision.
- c) Image acquisition and image transmission are two important processes. These two processes are the two principle sources of noise. Describe noise effect of image acquisition by imaging sensors. **(8+6+4)**

4.

- a) Compute the Haar Transform $T = HFH^T$ of the 2x2 image $F = \begin{bmatrix} 6 & -2 \\ 12 & 4 \end{bmatrix}$. Compute inverse Haar Transform $F = H^T TH$ of desired result
- b) Write a short note on Median Filtering.
- c) What is Image Restoration? Explain Uniform Noise **(6+6+6)**

5.

- a) Using LZW Coding Encode the following Sequence
 ABABBABCABABBA
 Initial Dictionary is

Symbol	Code
A	1
B	2
C	3

- b) Write short-note on Variable Length Coding.
 c) Give various Definitions of Computer Vision.

(6+6+6)

6.

- a) Define properties of Fast Fourier Transform.
 b) Suppose that we have the image given below. Use the region growing idea to segment the given object. The seed for the object is the center of the image. Region is grown both in horizontal and vertical direction, and when the difference between the two pixel values is less than or equal to 5.

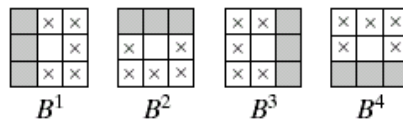
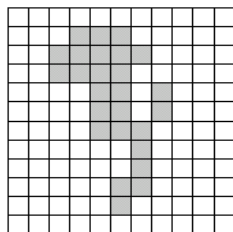
10	10	10	10	10	10	10
10	10	10	69	70	10	10
59	10	60	64	59	56	60
10	59	10	60	70	10	62
10	60	59	65	67	10	65
10	10	10	10	10	10	10
10	10	10	10	10	10	10

- c) Why discrete histogram equalization technique does not yield flat histogram?

(8+6+4)

7.

- a) i) Give color conversion between following models
 - RGB TO CMY
 - RGB TO YIQ
 ii) Jusitfy: The white emitted from sunlight is different from white emitted by computer system
 b) Consider the Structuring Elements given below. Here 'x' indicates don't care values. Find out the Convex Hull for the below given figure:



(8+10)