No. of Printed Pages : **2**

Sl. No.

C7-R4 : DIGITAL IMAGE PROCESSING AND COMPUTER VISION

NOTE :

1. **Answer question 1 and any FOUR questions from 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) What do you understand by scotopic vision and photopic vision in terms of brightness adaptation ?

(b) Briefly explain Average filter with example.

(c) Explain the utility of Multiple Thresholding.

(d) What is the difference between least squares error and mean squared error ?

(e) Explain different types of digital images.

(f) What are the components of Human Visual System ?

(g) Explain the utility of Correlation in computer vision. **(7x4)**

2. (a) Given an image of size X*Y. Find the number of bits required to store it as binary, G-bit gray and color image respectively.

(b) What are the various distortions that can occur at the time of image acquisition ? Explain.

(c) For V = {1, 2}, find the shortest path length using 4, 8 and m-adjacency between p and q for the given image

3	1	2	1(q)
2	2	0	2
1	2	1	1
1(p)	0	1	2

(6+6+6)

3. (a) Describe the objective function and steps of K-means clustering algorithm.

(b) Elaborate Min, Max and Median filters. Apply Min, Max and Median filters each of size 3X3 on the given 6X6 image segment and compare the output.

1	4	0	1	3	1
2	2	4	2	2	3
1	0	1	0	1	0
1	3	1	0	2	2
2	5	3	1	2	5
1	1	4	2	3	0

(c) A fisherman is looking a fish at a 2 m height and sitting at a distance of 10 meter. Find the size of the image formed in the retina. **(6+6+6)**

4. (a) Explain the role of Hough Transformation in Edge detection.

(b) Explain the process of convolution in image processing.

(c) Suppose that a 3-bit image (L=8) of size 10 × 20 pixels (XY = 200) has the intensity distribution shown in following table. What would be the intensity distribution of the new transformed image after the histogram equalization process ?

Gray levels	0	1	2	3	4	5	6	7
Number of Pixels	50	0	50	0	50	0	50	0

(6+6+6)

5. (a) Filters are applied in spatial and frequency domain both to enhance the quality of images. What is the relationship between them ? Explain briefly.

(b) What are the various properties of Multiresolution analysis ? Briefly describe Haar Wavelet transform.

(c) How to transform the image from RGB to HIS space ? **(5+8+5)**

6. (a) Explain the role of Affine Transformation in the field of computer Vision.

(b) Compute the Compression ratio or degree of the following given image using Huffman and Run length coding.

3	3	3	2
2	3	3	3
3	2	2	2
2	1	1	0

(8+10)

7. (a) What is the role of active and snake contours in an image ?

(b) Explain Opening and Closing operations with example.

(c) What do you mean by motion estimation ? Briefly explain the methods used for motion estimation. **(6+6+6)**

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