Indian Institute of Engineering Science and Technology, Shibpur

B. Tech IT, 7th Semester Final Examination, November 2022

Subject: Image Processing (IT 4122)

Full Marks: 50 **Time: 3 hours**

Answer any **Five** Questions.

1. a) What is meant by image enhancement? What is contrast stretching? Write an algorithm to explain how this operation is implemented on a digital image.
   b)How does gray level slicing differ from bit plane slicing?
   c) Why is "gamma" correction important in displaying an image accurately on a computer screen?

   (1+2+3)+2+2

2. a)Suppose that a digital image is subjected to histogram equalization-what will be the result of second pass of histogram equalization? –explain with proper justification.
   b) What is meant by histogram matching? Write down the different steps to be performed for histogram matching operation.
   c) Perform histogram equalization on the following 8 × 8 image whose gray level distribution is given in the following table

Gray level	0	1	2	3	4	5	6	7
Number of pixels	8	10	10	2	12	16	4	2

   2+(1+3)+4

3. a)Compress ABRACADABRA using Huffman encoding. Using RLE, a string is compressed to 6A5C2B3D5E -what is the compression ratio?

   b) Draw the block diagram of JPEG image compression technique. Which step/s of JPEG image compression is/are responsible for lossy nature of JPEG? –explain with proper justification.

   (3+2)+(3+2)

4. a) Derive the discrete form of Laplacian operator (for image enhancement) from second order derivative.
   b) Explain the output of using 3×3 average filter twice over an image.
   c) "Suppose an image contains salt and pepper noise" - which one of mean and median filtering, will produce better result? Give proper justification.

   5+3+2

5. a) Write an algorithm for iterative global threshold operation in image segmentation. How adaptive thresholding can minimize the drawbacks of global thresholding operation?
   b) Mention the properties of region based segmentation. Write an algorithm for region growing technique using splitting and merging operation.

   (3+2)+ (2+3)

6. Write short notes on
   a. Histogram stretching
   b. Sampling and quantization
   c. Weighted average filter
   d. Spatial resolution enhancement by interpolation

   (3+3+2+2)