BE8-R4: DIGITAL IMAGE PROCESSING

«QP_SRLNO»

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) Why segmentation is required in image processing?
b) Explain the concept of spatial filtering.
c) State the Optimality conditions of Huffman code.
d) State the need of data compression.
e) Mention the difference between a monochrome and grayscale image.
f) List any two properties of median filter.
g) List out the coding system define in JPEG standard.

(7x4)

2.
a) Grey level histogram of an image is given below:

Grey Level	0	1	2	3	4	5	6	7
Frequency	400	700	1350	2500	3000	1500	550	0

Compute the grey level histogram of the output image obtained by enhancing the input by the histogram equalization technique.
b) Explain the basic concepts of sampling and quantization with neat sketch.

(10+8)

3.
a) What do you mean by edge in an image? Explain how sharpening filter may be use to enhance edges. Also discuss how first and second derivative may be use for detecting edges in an image.
b) What are grey level transformations? Explain grey level slicing and contrast stretching.

(10+8)

4.
a) Describe constrained least square filtering for image restoration and drive its transfer function.
b) Describe Sobel & Prewitt 3x3 operator. Where are they used?

(9+9)

5.
a) For the image shown below compute the compression ratio that can be achieved using Huffman coding:

$$\begin{bmatrix} 3 & 3 & 3 & 2 \\ 2 & 3 & 3 & 3 \\ 3 & 2 & 2 & 2 \\ 2 & 1 & 1 & 0 \end{bmatrix}$$

b) How an image is compressed using JPEG Image compression standard?

(9+9)

6.
a) Illustrate the different causes of image degradation.
b) Differentiate between Geometric and plane to plane transformation in image processing.
c) Explain the Pseudo and False coloring.

(6+8+4)

7. Discuss the following (**any four**):
a) LOG filter
b) Non-Linear stretching
c) Singular Value Decomposition
d) Bit-plane slicing
e) Image fusion

(4.5x4)