## **BE8-R3: DIGITAL IMAGE PROCESSING**

#### 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) Explain the steps in image processing with the help of block diagram.
- b) What are the elements of visual perception?
- c) Give one example of each of smoothing filter and sharpening filter?
- d) Explain the Discrete Fourier Transform.
- e) What is inverse filtering?
- f) Explain the thresholding method of segmentation.
- g) Describe an application of image processing in medical sciences.

(7x4)

- 2.
- a) Explain the steps involved in sampling and digitization of images. How many minutes are required for a 512x512 image with 256 grey levels at 300 baud rate for transmission? The transmission is accomplished using packets consisting of an start bit, a byte (8 bits) of information and a stop bit. Baud rate means number of bits per second.
- b) Find the Fourier Transform for given function f(x, y) as shown in Figure 1.



(Figure 1.)

(10+8)

3.

a) An image is represented by the following frequency table of gray levels.

Gray level	0	1	2	3	4	5	6	7
Frequency of Occurrence	123	78	281	417	639	1054	816	688

Obtain the frequency table of equalized histogram.

b) Describe the methods of enhancement by point processing.

(10+8)

4.

- a) Write the general expression for forward and inverse transform for 2D square arrays. Show that Hadamard Transform consists of series expansion of basis function whose values are +1 or -1.
- b) Show that the discrete fourier transform and its inverse are periodic functions.
- c) Explain the action of the following spatial mask on an image.

0	-1	0
-1	4	-1
0	-1	0

### (8+5+5)

5.

- a) With the help of degradation model explain the restoration process of an image.
- b) What is binary morphology? Explain the Hit or Miss Transformation for binary images.

(10+8)

# 6.

- a) Explain texture in images. What are the different approaches to analyze texture? Give examples.
- b) Describe the RGB Color Model.
- c) What do you understand by Pseudo Color Image Processing?

(10+4+4)

7.

- a) Why is compression needed in images? Describe the data redundancy identified in image compression.
- b) Outline the procedure to implement Huffman Coding.
- c) What are the steps involved in JPEG compression.

(7+4+7)