USN | | | | | | | | | | | 15MT754

Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019
Digital Image Processing

Time: 3 hrs.   Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. Explain the fundamental steps involved in digital image processing. **(10 Marks)**
   b. Define digital image processing and list out the applications of digital image processing. **(06 Marks)**

OR

2 a. With a neat block diagram, explain the components of an Image Processing System. **(08 Marks)**
   b. Briefly describe human visual system with a neat diagram. **(08 Marks)**

Module-2

3 a. Distinguish between linear versus Non-linear operations with an example, for each. **(10 Marks)**
   b. Define 4-adjacency, 8-adjacency and m-adjacency between pixels. **(06 Marks)**

OR

4 a. Explain the concept of sampling and quantization in image processing. **(08 Marks)**
   b. With an example, explain image interpolation. **(08 Marks)**

Module-3

5 a. Define 2-D orthogonal and unitary transforms. **(08 Marks)**
   b. Obtain Haar transform for N = 4. **(08 Marks)**

OR

6 a. Write the generation of N×N Hadamard Transform. Mention its properties and advantages. **(10 Marks)**
   b. An image u and information matrix A are given below. Obtain the transformed image

$$u = \begin{bmatrix} 6 & 3 \\ 12 & 1 \end{bmatrix} \quad A = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$$

(06 Marks)

Module-4

7 a. Suppose that a 8-bit image of size 64×64 pixel has intensity distribution as given in the table below. Find the histogram equalization using linear stretching **(08 Marks)**

r_k	n_k
0	790
1	1023
2	850
3	656
4	329
5	245
6	122
7	81

b. With a neat block diagram, explain homomorphic filtering approach for image enhancement.

(08 Marks)

OR

8 a. Explain the smoothening of images in frequency domain using (i) ideal law pass filter (ii) Butterworth law pass filter. **(10 Marks)**

b. Write a note on :
   (i) Contrast stretching
   (ii) Gray – level Slicing. **(06 Marks)**

Module-5

9 a. Describe the different noise models with their probability density function. **(08 Marks)**

b. Derive an expression for linear degradation model in presence of additive noise. **(08 Marks)**

OR

10 a. Draw the block diagram of gray level to color transformation and explain. **(08 Marks)**

b. Develop a procedure for converting
   (i) RGB to HSI
   (ii) HSI to RGB. **(08 Marks)**

* * * * *