

(REVISED COURSE)

(3 Hours)

[Total Marks : 100

- N.B.** (1) Question No. 1 is **compulsory**.  
 (2) Attempt any **four** questions from the remaining **six** questions.  
 (3) Assume **suitable** data if **necessary**.

1. (a) Explain Isopreference Curves with respect to image processing. 20  
 (b) Compare between contrast stretching and Histogram Equalisation.  
 (c) Explain Median filter and Mean filter.  
 (d) Explain spatial and tonal resolution  
 (e) Compare Lossy and Lossless Compression.

2. (a) What is Histogram of a image ? What information can be obtained from the Histogram of an image ? 5  
 (b) A digital image with eight levels of quantization has its gray level distribution : 10

Gray level $r_k$	0	1/7	2/7	3/7	4/7	5/7	6/7	1
No. of pixels $n_{r,k}$	790	1023	850	656	329	245	122	81

Modify the above distribution such that the desired distribution is as follows :

Gray level $Z_r$	0	1/7	2/7	3/7	4/7	5/7	6/7	1
No. of pixels $n_{r,k}$	0	0	0	614	819	1230	819	614

- (c) With the help of neat block diagram explain the basic functional elements of an image processing system. 5
3. (a) Apply Low Pass and High Pass Spatial Mask on the following image matrix : 10

$$F = \begin{bmatrix} 5 & 4 & 7 & 1 & 2 \\ 6 & 2 & 3 & 4 & 1 \\ 3 & 5 & 6 & 8 & 2 \\ 4 & 3 & 7 & 1 & 8 \end{bmatrix}$$

- (b) Assume that an edge start first rows and ends in last row for the following gray level image. Sketch possible paths and also determine edge corresponding to the minimum cost path use graph theoretic technique : 10

7	2	2
5	7	2
5	1	0

4. (a) What is Hough transform ? How it can be used for line detection ? Explain with the help of an example. 10  
 (b) A source emits six symbols with probabilities as shown below : 10  
 $a_1 \rightarrow 0.1$     $a_2 \rightarrow 0.4$     $a_3 \rightarrow 0.06$     $a_4 \rightarrow 0.1$     $a_5 \rightarrow 0.04$     $a_6 \rightarrow 0.3$ .  
 Obtain the Huffman Coding of the Symbols.

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5. (a) List the types of redundancies in digital images. 10  
 Explain (i) Interpixel redundancy and  
 (ii) Psychovisual redundancy in detail.
- (b) Find the DFT of the image segment given below : 10

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

6. (a) Give the following Masks and explain their usefulness in Image Processing. 10  
 (i) Sobel operator (iii) Low pass filter  
 (ii) Prewitt operator (iv) High pass filter.
- (b) Describe the region growing and splitting and Merging methods of image processing. 10
7. Write short notes on (any **four**) :— 20
- Homomorphic filtering
  - K-L Transform
  - Image acquisition method
  - Connectivity of pixels
  - Dilation and Erosion.