Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 08

M.Tech.(IT) (2015 & Onwards)/(CSE Engg.) (2015 to 2017) (Sem.–1)

DIGITAL IMAGE PROCESSING

Subject Code : MTCS-105

Paper ID : [72633]

Time : 3 Hrs. Max. Marks : 100

INSTRUCTION TO CANDIDATES :

1. **Attempt any FIVE questions out of EIGHT questions.**
2. **Each question carries TWENTY marks.**

1. a. Describe in detail about the fundamental steps in image processing.

   b. Explain the basic concepts of sampling and quantization. How do they affect the quality of an image?

2. a. Describe in detail the elements of visual perception.

   b. Consider the image segment shown. Let V = {1,2} compute the lengths of the shortest 4-, 8-, and m- path between p and q. If a particular path does not exist between these points, explain wny?

3	1	2	1	(q)
2	2	0	2	
1	2	1	1	
(p)1	0	1	2	

3. a. What do you mean by image enhancement? Describe in detail a transformation function that is used to increase the contrast of an image.

   b. Describe in detail spatial domain and frequency domain methods for image enhancement.

4. a. Explain 2D DCT with its properties.

   b. Write short notes on:

      i. Image subtraction and image averaging

      ii. Smoothing and sharpening filters

5. a. With a neat block diagram, explain lossless predictive coding approach for image compression.

   b. Describe in brief Huffman coding. Construct the Huffman codes for the source symbols the probabilities of which are tabulated below.

Symbol	Probability
S1	0.19
S2	0.21
S3	0.25
S4	0.08
S5	0.16
S6	0.06
S7	0.02
S8	0.03

6. a. Draw the block diagram of image degradation model and explain in detail.

   b. Explain in detail the procedure used for diagonalization of circulant and block circulant matrices.

7. a. Explain in detail any two boundary representation schemes with illustrative examples.

   b. Describe edge linking and boundary extraction procedure in detail.

8. Write short notes on :

   a. Multispectral image analysis.

   b. Computerized Axial Tomography.