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

Total No. of Questions : 09

B.Tech.(CSE) (2011 Onwards Elective-III) (Sem.–7,8)

DIGITAL IMAGE PROCESSING

Subject Code : BTCS-915

Paper ID : [A2997]

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Write briefly :

a) Define coding redundancy.

b) What is the need of data compression?

c) What is the concept of histogram equalization?

d) Give the linear filter mask for detecting vertical edges.

e) What are the performance metrics used in image restoration?

f) Give any two applications of image segmentation techniques.

g) Does the use of chain code compress the description information of an object contour?

h) Mention the difference between monochrome and grayscale image.

i) What is the concept behind marker selection?

j) List the applications of singular value decomposition in image processing.

SECTION-B

2. What are the stages of Canny edge detector? Explain each phase.

3. Prove that gradient of image intensity due to Prewitt operator along horizontal direction can be obtained by convolving the image by [1 1 1] followed by $[-1\ 0\ 1]^T$ and then scaling the result by 1/3.

4. What are the advantages of DWT over DCT with respect to image compression? Elaborate with example.

5. What is Haar transform? Compute the 2D Haar transform of the signal $f(m, n) = \begin{bmatrix} 4 & -1 \\ 2 & 3 \end{bmatrix}$

6. Compare and contrast deterministic and stochastic methods of image restoration.

SECTION-C

7. Find a set of code words and average word length using Huffman coding scheme for a set of input graylevels with probabilities as given below :

Input	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8
Probability	0.02	0.15	0.03	0.15	0.05	0.20	0.10	0.30

Compute the lowest possible average bits per gray level required to represent this data.

8. Explain the principle of following region-based segmentation procedures :

   a) Region growing

   b) Region splitting

   c) Split and merge

   Also mention the difference between these approaches.

9. Write short note on :

   a) Psychovisual redundancy

   b) Homomorphic Filtering