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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SECOND SEMESTER M.TECH DEGREE EXAMINATION, MAY 2016

Electronics &Communication Engineering

Signal Processing

01EC6304 Digital Image Processing

Max. Marks : 60 *Duration: 3 Hours*

PART A (Answer *any two* questions)

1. a. Determine the DFT matrix for N=4. (5 Marks)
   b. Explain the principle of homomorphic filter. (4 Marks)
2. a. DCT has excellent energy compaction for highly correlated data .Why? (5 Marks)
   b. Compare histogram equalization and histogram matching. (4 Marks)
3. a. Prove that two dimensional circular convolution of two arrays is the product of their DFTs. (5 Marks)
   b. Explain the mechanism of unsharp masking. (4 Marks)

PART B (Answer *any two* questions)

4 a. Derive an expression for the transfer function of 2D Wiener filter. (5 Marks)

   b. Explain Huffman coding. (4 Marks)

5 a. The different combination of 3x3 images are given below (5 Marks)

$$\text{(i)}\begin{bmatrix}0 & 1 & 1\\ 1 & 2 & 1\\ 2 & 1 & 1\end{bmatrix} \qquad \text{(ii)}\begin{bmatrix}1 & 0 & 1\\ 1 & 2 & 1\\ 2 & 1 & 0\end{bmatrix} \qquad \text{(iii)}\begin{bmatrix}1 & 0 & 2\\ 1 & 2 & 0\\ 2 & 1 & 0\end{bmatrix}$$

   In which case the entropy is minimum? Justify your answer?

   b. Explain LOG filter . (4 Marks)

6 a Explain diagonalisation of block circulant matrices. (5 Marks)

   b. Explain any two types of objective Fidelity criteria. (4 marks)

PART C (Answer *any two* questions)

7 a Explain morphological operations required for generating the skeleton of an image. (6 Marks)

   b Discuss Fourier slice theorem. (6 Marks)

8 a. What are structuring elements? (6 Marks)

   b. Explain Algebraic Reconstruction Technique. (6 Marks)

9 a. Describe the image reconstruction technique using parallel beam filtered back projection. (6 Marks)

   b. Explain hit-and-miss transform. (6 Marks)
