

APJ Abdul Kalam Technological University
 First Semester M.Tech Degree Examination December 2017
 Ernakulam II Cluster
05CS 6013 – DIGITAL IMAGE PROCESSING

Time: 3 hrs.

Max. Marks: 60

I.

- a) Compute the histogram equalization of the below image where the maximum pixel intensity is 7 [6 Marks]

$$\begin{bmatrix} 3 & 4 & 3 & 3 & 4 \\ 3 & 4 & 5 & 4 & 3 \\ 3 & 5 & 5 & 5 & 3 \\ 3 & 4 & 5 & 4 & 3 \\ 4 & 4 & 4 & 4 & 4 \end{bmatrix}$$

- b) Justify yes or no, whether two different images can have same histogram? [3 Marks]
 c) Write the condition for m-adjacency of pixels. [3 Marks]

II

- a) Prove the Separability of the 2 Dimensional Discrete Fourier Transform. [4 Marks]
 b) Write the algorithm for adaptive median filtering algorithm that works in two stages. [6 Marks]
 c) Discuss the behavior of contraharmonic filter for positive and negative values of Q. [2 Marks]

III

- a) Compute the Haar transform of the 2*2 image [6 Marks]

$$\begin{bmatrix} 3 & -1 \\ 6 & 2 \end{bmatrix}$$

 b) Write the properties of Scaling functions and wavelet functions with the help of equations. [6 Marks]

- c) Discuss in detail about Golomb coding with the help of an example. [6 Marks]

OR

IV

- a) Construct a fully populated approximation pyramid and corresponding prediction residual pyramid for the image. Use 2*2 block neighborhood averaging for the approximation filter and assume the interpolation filter implements pixel replication.

$$f(x,y)= \begin{bmatrix} 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \\ 9 & 10 & 11 & 12 \\ 13 & 14 & 15 & 16 \end{bmatrix} \quad [9 \text{ Marks}]$$

- b) Encode the message COMMITTEE using Huffman coding [9 Marks]

V

- a) Write the algorithm for basic global thresholding. [7 Marks]
b) Write the algorithm for region growing segmentation. [7 Marks]
c) Discuss in brief about Chain Codes. [4 Marks]

OR

VI

- a) Write the method for the detection of edge in detail. [9 Marks]
b) Write the algorithm for region splitting and merging. [9 Marks]