

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE SEM-VIII Examination May 2012****Subject code: 181102****Subject Name: Fundamentals of Image Processing****Date: 08/05/2012****Time: 10.30 am – 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) What is contrast stretching? Explain any one contrast stretching function with help of graph and its pseudo code for implementation **07**
- (b) Draw and explain structure of human eye and discuss human vision system **07**

- Q.2** (a) Answer the following questions **07**
- [1] List different types of image file formats
  - [2] What is simultaneous contrast?
  - [3] How much storage capacity required to store image with size of 1024x768 and 256 gray levels
  - [4] Write any 3x3 mask for low pass filtering of an image
  - [5] What type of filter is most effective for Gaussian noise?
  - [6] What is wavelet? How wavelet transform differs from Fourier transform?
  - [7] Why Sobel edge detection is preferred over Prewitt edge detection?
- (b) What is histogram? Explain histogram equalization algorithm. Write pseudo code or Matlab code for calculation of histogram and histogram equalization **07**

**OR**

- (b) Explain basic concepts of image sampling and quantization. Discuss spatial and gray level resolutions. **07**
- Q.3** (a) Discuss steps of image filtering in frequency domain. Discuss 2D discrete Fourier transform with help of equations. **07**
- (b) What are the frequency domain filters available to sharpen the image? Discuss any one practical image sharpening filter with mathematical description. **07**

**OR**

- Q.3** (a) Explain basic principle of homomorphic filtering. Draw and explain implementation block diagram of homomorphic filtering **07**
- (b) Explain arithmetic coding procedure with appropriate example. What type of redundancy is removed by the arithmetic coding? **07**

- Q.4** (a) What is the difference between degradation and noise? Explain image degradation and restoration model. **07**
- (b) Explain 2D wavelet transform for digital image processing with help of block diagram **07**

**OR**

- Q.4** (a) What is redundancy? What are the different types of redundancy available **07**

- in the digital image? Explain inter-pixel redundancy
- (b)** What is first order and second order derivatives of an image? Why second order derivative is not much preferred for edge detection? How Laplacian of Gaussian (LoG) solves problem of second order derivative for edge detection? **07**
- Q.5 (a)** What is the purpose of Hough transform? Write steps of Hough transform for XY plane. What problem occurs in Hough transform in XY Plane for vertical line? **07**
- (b)** Explain dilation and erosion morphological operations **07**
- OR**
- Q.5 (a)** Explain thinning and thickening operations on the digital image. **07**
- (b)** Explain RGB color model. What is the HEX code for pure RED color in 24 bit representation? How RGB to CMY conversion is done? **07**

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