

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – II • EXAMINATION – WINTER • 2014****Subject code: 1720104****Date: 04-12-2014****Subject Name: Digital Image Processing****Time: 02:30 pm - 05:00 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) Briefly explain use of Image interpolation. Explain different methods of image interpolation with their merits and demerits **07**
- (b) Briefly explain image acquisition using single sensor, linear sensor strip and using sensor arrays. **07**

- Q.2** (a) Briefly explain power-law transformation as image enhancement. Briefly explain enhancement of dark and washed-out appearance image using power-law transformation **07**
- (b) Briefly explain Histogram equalization. Suppose that the intensity values in an image have the PDF **07**

$$P_r(r) = 2r/(L-1)^2 \text{ for } 0 \leq r \leq L-1$$

$$= 0 \text{ otherwise}$$

What is the transformation function you would use for histogram equalization? Justify your answer.

OR

- (b) Briefly explain Laplacian and Gradient sharpening filter in spatial domain. **07**
- Q.3** (a) Briefly explain property of 2-D Discrete Fourier transform. Prove that $F(f(x,y) * (-1)^{x+y}) = F(u-M/2, v-N/2)$ **07**
- (b) Briefly explain ideal High-pass, Bandpass and Bandreject filter in frequency domain. Explain the reason for ringing effect in the result image. **07**

OR

- Q.3** (a) Explain the objective of homomorphic filtering and its implementation. Derive necessary equations **07**
- (b) Compare image enhancement and image restoration. With the help of block diagram and equation explain model of image restoration in spatial domain and in frequency domain **07**
- Q.4** (a) Briefly explain Hough transform. Why it is used? How does it is useful to find circular shape? **07**
- (b) Briefly explain the use of motion in image segmentation. Also explain use of absolute, positive and negative accumulative difference image (ADI) for segmenting moving object. **07**

OR

- Q.4** (a) Briefly explain morphological gradient, morphological smoothing filter and top-hat transformation. **07**
- (b) Briefly explain local threshold, global threshold and adaptive threshold. Briefly explain an algorithm to find global threshold. **07**

- Q.5 (a)** Briefly explain convolution and correlation with their applications **07**
- (b)** Briefly explain following morphological operations with their applications **07**
1. Erosion
 2. Dilation
 3. Closing
 4. Opening

OR

- Q.5 (a)** Briefly explain Discrete Wavelet transform and its applications. **07**
- (b)** Explain the following fundamentals of image compression: Compression ratio, types of redundancy, source encoding, channel encoding **07**

