Seat No.: _____ Enrolment No._____

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**

$P_r(r)=2r/(L-1)^2$ for $0<=r<=L-1$
$=0$ 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 1. Erosion 2. Dilation 3. Closing 4. Opening	**07**

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**

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