Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – III • EXAMINATION – WINTER 2012

Subject code: 732304 **Date: 26/12/2012**

Subject Name: Speech and Image processing (Major Elective – IV)

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)**	Define the following terms: (i) digital image (ii) Pixel (iii) spatial resolution (iv) Gray level resolution.	**04**
	(b)	Define m-adjacency, connected component and chessboard distance with an example.	**07**
	(c)	Briefly explain sampling and quantization processes to create digital image.	**03**
Q.2	**(a)**	Define histogram of an Image and state its applications How does the histogram equalization process enhance the image .	**07**
	(b)	Define and explain compression ratio, coding redundancy, and entropy. Discuss the steps in Huffman coding for lossless compression with an example.	**07**
		OR	
	(b)	What do you mean by Color model and what is its purpose? List the application of each color model. Explain any one color model in brief.	**07**
Q.3	**(a)**	Explain Homomorphic filtering for image enhancement in detail.	**07**
	(b)	Explain 2D Discrete time Fourier Transform and its properties.How is it a useful atool for image processing applications.	**07**
		OR	
Q.3	**(a)**	What is image smoothening? Explain smoothing spatial filters.	**07**
	(b)	Give the procedure steps for filtering an image in frequency domain. Show the correspondence of the filtering in frequency domain to the spatial filtering.	**07**
Q.4	**(a)**	How edge detection is used for detecting discontinuities in digital image? Explain edge detection using Sobel and Laplacian operators .	**07**
	(b)	Explain how the ideal low-pass, high-pass, band-pass and band-reject filters are implemented in spectral domain. Explain the reason for ringing effect in the result image.	**07**
		OR	
Q.4	**(a)**	Explain the concept of thresholding in image segmentation.	**07**
Q.4	**(b)**	Define Local thresholding, Global Thresholding and Dynamic or adaptive Thresholding.	**07**
Q.5	**(a)**	Explain Dilation and Erosion operations briefly for morphological processing.	**07**
	(b)	Explain morphological Hit-or-Miss transform for shape detection.	**07**
		OR	
Q.5	**(a)**	Write a brief note on(i) HMM based speech recognition (ii)Text to speech synthesis process	**07**
	(b)	Explain the following Standards: (1) JPEG 2000 (2) MPEG	**07**

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