Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2013

Subject code: 714104N **Date: 17-06-2013**

Subject Name: Digital Image Processing and Applications

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)** Give the algorithm for getting connectivity in the image using the N_4 neighborhood. **07**

(b) In the image shown in Fig 1 compute D4, D8 and Dm distances between pixels p and q for V= {2,3,7}. Take pixel p as center of the image and find the distances for all other pixels considered as q pixels. **07**

	1	2	2	2	3	q
	5	3	5	6	7	
	5	2	5	5	6	
	7	5	1	7	7	
p	7	4	2	3	1	

Fig 1: Image segment of 5X 5

Q.2 **(a)** Explain the homomorphic filtering in detail. What are the advantages of homomorphic filtering; explain with the help of suitable derivations. **07**

(b) Apply median operator on image shown in Fig 2 and conclude about the results. (Use zero padding). **07**

1	1	7	7	7	8	8	8
6	6	6	5	5	5	1	8
6	6	6	5	5	1	8	8
8	7	7	5	1	8	8	8
8	8	8	5	5	8	8	8
8	8	8	5	1	7	1	8
8	8	8	5	5	7	1	8
8	8	8	5	5	7	1	8

Fig 2: Image segment of 8 X 8 size

OR

(b) Explain the spatial domain filtering technique in detail. **07**

Q.3 **(a)** Explain the histogram equalization technique in detail with suitable example. **07**

(b) The basic approach used to approximate a discrete derivative involves taking differences of the form f(x+1,y) ï f(x,y) **07**

1) Obtain the filter transfer function, H(u,v), for performing the equivalent process in the frequency domain.
2) Show that H(u,v) is a highpass filter.

OR

Q.3 **(a)** Explain the histogram matching technique in detail with suitable derivations. **07**

(b) Discuss the basic properties in frequency domain of a digital image. State the two dimensional DFT and its inverse. **07**

Q.4	**(a)**	Discuss various filters used for detecting lines and edges in image, and give the mathematical logic behind the filter	**07**
	(b)	Discuss: Hough transform in X-Y coordinate system.	**07**
		OR	
Q.4	**(a)**	Explain the basic morphological operators: dilate and erode with suitable example.	**07**
	(b)	State different applications of image morphology and explain in detail.	**07**
Q.5	**(a)**	Explain the morphological algorithm: Skeletonize in detail.	**07**
	(b)	Explain the canny edge detection algorithm in detail.	**07**
		OR	
Q.5	**(a)**	State different applications of Digital Image Processing and explain any one application in detail.	**07**
	(b)	Explain the global thresholding technique with suitable derivations.	**07**

****