Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject code: 1720104 **Date: 03-06-2013**

Subject Name: Digital Image Processing

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) Answer the following questions:

(i) How many different colors you can have in a 3 bit/pixel image? **02**

(ii) How many bytes are required to store an image of 20x20 having 64 different intensity levels? **02**

(iii) Write fundamental steps in image processing. **02**

(iv) Euclidean Distance **01**

(b) What would be the impact of the removal of the last bit in the histogram for the following image? $\begin{pmatrix} 6 & 7 & 1 \\ 5 & 1 & 4 \\ 1 & 2 & 3 \end{pmatrix}$ **07**

Q.2 **(a)** Explain high-boost filtering and unsharp masking. **07**

(b) Describe different point processing techniques used for Image Transformation **07**

OR

(b) Compare Laplacian and Gradient methods for Image Sharpening **07**

Q.3 **(a)** Explain Digitization and Image sampling. **07**

(b) What are 3 basic types of gray level discontinuities in digital image? Explain them. Elaborate the stages in edge detection. **07**

OR

Q.3 **(a)** Explain horizontal, vertical and diagonal edge detection operators along with their masks. **07**

(b) Discuss the different types of Color models in brief. **07**

Q.4 **(a)** Explain different Low Pass and High Pass filtering in the Frequency Domain **07**

(b) . Prove that the Hadamard transform works for the following images: **07**

a. $\begin{pmatrix} 2 & 2 \\ 2 & 1 \end{pmatrix}$

OR

Q.4 **(a)** Explain mean, median filter and importance of using them in a image. **07**

(b) Explain feature , texture ,pattern , cluster with respect to image processing. **07**

Q.5 **(a)** Given the image A : And structuring element B: **07**

(A)

0	0	0	0	0	0
0	0	**1**	**1**	0	0
0	**1**	**1**	**1**	**1**	0
0	0	**1**	**1**	0	0
0	0	0	0	0	0

(B)

1
1
1

Compute the following :
a. Reflection of B
b. A dilated by B
c. A^c eroded by B

(b) Explain the any 3 morphological operations in short. **07**

1. Boundary extraction
2. Noise removal
3. Thinning
4. Thickening
5. Convex Hull
6. Region filling

OR

Q.5 **(a)** Explain the principal of region growing. **07**

(b) Explain methods for lossy image compression technique. Discuss any one of them. **07**

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