Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– I (New course)• REMEDIAL EXAMINATION – SUMMER 2015

Subject Code: 2714104 **Date:15/05/2015**

Subject Name: Digital Image Processing

Time: 10:30 am to 1:00 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)** Explain histogram equalization with all necessary derivation. **07**

(b) A 3-bit image of size 64 x 64 pixels has the intensity distribution shown in following Table. Obtain an original histogram, transformation function, equalized histogram. **07**

r_k	0	1	2	3	4	5	6	7
n_k	790	1023	850	656	329	245	122	81

Q.2 **(a)** Explain the mechanisms of Spatial filtering. Explain sharpening spatial filtering in details. **07**

(b) Explain 2-D Discrete Fourier transform and its inverse. Explain properties such as relationships between spatial and frequency intervals, Translation and rotation. **07**

OR

(b) List the summary of steps for filtering in the frequency domain. What are the correspondences between filtering in the spatial and frequency domain? **07**

Q.3 **(a)** Explain image sharpening using frequency domain filters. **07**

(b) Explain the median value of the marked pixel with suitable example of an image using 3 x 3 masks. **07**

OR

Q.3 **(a)** Justify the statement ñMedian filter is an effective tool to minimize salt-and pepper noise through a following image corrupted by the noise. The corrupted pixels are 255 and 0. **07**

24	22	33	25	32	24
34	255	24	0	26	23
23	21	32	31	28	26

(b) Explain all periodic noise reduction methods by frequency domain filtering. **07**

Q.4 **(a)** Explain minimum mean square error filtering in details. **07**

(b) Explain the canny edge detection algorithm in details **07**

OR

Q.4 **(a)** List all morphological operations and explain any two operations in details. **07**

(b) Explain morphological reconstruction by dilation and by erosion. **07**

Q.5 **(a)** Explain line detection using Hough Transform. **07**

(b) Explain segmentation using watershed transform. **07**

OR

Q.5 **(a)** Explain digital watermarking in details. **07**

(b) Explain the histogram matching techniques in details with necessary derivation for continuous and discrete variables. **07**

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