Reg. No.

MANIPAL INSTITUTE OF TECHNOLOGY
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VI SEMESTER B.TECH (COMPUTER SCIENCE AND ENGINEERING) DEGREE
MAKEUP EXAMINATION - JULY 2013
SUBJECT: ELECTIVE I – DIGITAL IMAGE PROCESSING (CSE 320)
DATE: 23-07-2013

TIME: 3 HOURS   MAX. MARKS: 50

INSTRUCTIONS TO CANDIDATES
- ANSWER ANY **FIVE** FULL QUESTIONS.

1A. Describe different types of images acquired from energy source in an electromagnetic spectrum.   [05]

1B. What is the use of image interpolation? Explain different types of interpolation.   [03]

1C. Define adjacency, connectivity, region and boundaries in an image.   [02]

2A. With a suitable example explain the process of histogram matching.   [05]

2B. Explain the basics of spatial filtering by convolution and correlation.   [02]

2C. Derive the Laplacian for image sharpening. How it is used in high-boost filtering? [03]

3A. Mention the steps for filtering in frequency domain.   [02]

3B. Develop a frequency domain procedure for improving appearance of an image by reducing uneven illumination and contrast enhancement.   [04]

3C. With proper mathematical expressions, describe four types of order statistic filters.   [04]

4A. A 1024×1024 8-bit image with 5.3 bits/pixel entropy is to be Huffman coded.

   (i)   What is the maximum compression that can be achieved?

   (ii)   Will it be obtained?

   (iii) If a greater level of lossless compression is required, what else can be done? [03]

4B.   Use the LZW coding algorithm to encode the 7-bit ASCII string "aaaaaaaaaaa". Let 97 be ASCII of 'a'. Assume that first 255 entries in dictionary are used up.   [03]

4C.   Define data redundancy and explain different forms of redundancies and suggest at least one technique to eliminate/reduce each form of redundancy.   [04]

5A.   Provide the mathematical expressions for gray scale dilation and erosion. Explain how dilation and erosion are used in image smoothing, finding gradient, Top-hat and Bottom-hat transformations of gray scale image.   [05]

5B.   Explain the process of template matching in binary image using mathematical morphology.   [03]

5C.   Prove that dilation and erosion are duals of each other.   [02]

6A.   Derive an expression to find between class variance for optimal thresholding.   [05]

6B.   Explain Hough transform to detect lines in an edge detected image.   [05]

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