Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
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MANIPAL-576104

SIXTH SEMESTER B.E DEGREE MAKE UP EXAM - JULY 2012
SUBJECT: ELECTIVE I – DIGITAL IMAGE ANALYSIS (CSE 310.1)
(REVISED CREDIT SYSTEM)

TIME: 3 HOURS JULY 19TH 2012 MAX. MARKS: 50

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

1A. Explain the fundamental steps in digital image processing. [04]

1B. Consider the image segment shown.

	3	1	2	1 (q)
	2	2	0	2
	1	2	1	1
(p)	1	0	1	2

(a) Let V = {0, 1}, compute the lengths of shortest 4-path, 8-path and m-path between p and q. If a particular path does not exist between these two points, explain why.

(b) Repeat for V = {1, 2}. [04]

1C. What are the effects of increasing or decreasing the spatial and gray level resolution on image and its size? [02]

2A. Explain the following gray level transformations and their uses:

(i) Log transformation (ii) Piecewise-linear transformation [03]

2B. Prove that transformation function of histogram equalization yields uniform probability function. [04]

2C. Explain the concept of spatial filtering for image enhancement. [03]

3A. Give the mathematical formulation for fourier transform pair $f(x,y)$ and $F(u,v)$. Also show that at $u=v=0$, fourier transform is equal to the average gray level of the image. [02]

3B. Discuss any two filters for sharpening an image in frequency domain. [04]

3C. Explain any four spatial mean filters used for noise reduction. [04]

4A. Derive the optimal threshold that produce the minimum average segmentation error. Show that if probabilities of occurrences of background and object pixels are same, then optimal threshold reduces to basic global threshold. [05]

4B. Explain with an example the graph based technique for the edge linking. [05]

5A. Describe the basic morphological tool for shape detection. [03]

5B. What is pruning? Provide the morphological operation for pruning. [04]

5C. Prove that morphological opening and closing are duals of each other with respect to the set complementation and reflection. Also provide any three properties satisfied by opening and closing. [03]

6A. Explain how Medial axis transformation ensures connected skeleton. [04]

6B. Explain different polygonal approximation techniques for boundary representation. [03]

6C. In case of sharpening filters describe the responses of first order and second order derivatives in the areas of constant gray level, at the onset and end of discontinuities and along gray level ramp in an image. [03]

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