GANPAT UNIVERSITY
B. TECH SEM. VII (COMPUTER ENGINEERING / INFORMATION TECHNOLOGY)
REGULAR EXAMINATION NOV/DEC – 2012
CE703 / IT703 : IMAGE PROCESSING

Total Time: 3 hours   **Total Marks: 70**

Instructions: 1. Write each section in separate answer sheet.
2. Figure to the right indicates full marks.
3. Assume suitable data wherever necessary.

SECTION – I

Q – 1 (a) Find the shortest 4-path, 8-path and m-path between P and Q in the image given in fig. (a) on page 2. Let V={0,1,2}.   **[6]**

(b) What is false countering? what is the reason for it?   **[2]**

(c) Discuss the order statistic filters.   **[4]**

OR

Q – 1 (a) Explain all kinds of distance measures with examples.   **[6]**

(b) Discuss any one application of image subtraction in brief.   **[2]**

(c) Explain any two piece-wise linear transformation in detail.   **[4]**

Q – 2 (a) Find the Average Intensity and Intensity Variance using the histogram statistics for the image given in fig. (b) on page 2.   **[6]**

(b) Discuss various masks based on first order derivative for sharpening the image.   **[5]**

OR

Q – 2 (a) Consider the histogram values given below, for the 50 x 50, 3-bit image: **[6]**

r_k	0	1	2	3	4	5	6	7
n_k	280	190	580	125	465	182	513	165

For the above image, achieve following histogram specification.

z_q	0	1	2	3	4	5	6	7
$p_z(z_q)$	0	0	0	0	0.19	0.27	0.28	0.26

(b) Explain the log transformation and power-law transformation in detail.   **[5]**

Q – 3 (a) Differentiate among computer graphics, image processing, image analysis and computer vision.   **[4]**

(b) Discuss the steps to apply the filter in frequency domain.   **[6]**

(c) Explain the unit impulse and its sifting property.   **[2]**

Q – 4 (a) What is convex hull? State the procedure to derive convex hull. Find the convex hull for the image given in fig. (c) on page 2. [8]

(b) State and explain the characteristics of the opening and closing. [4]

OR

Q – 4 (a) Extract the connected components for the image given in figure (d). 'S' indicates the starting point of the process. [6]

(b) Discuss the thinning morphological operation in detail. [6]

Q – 5 (a) Derive the LoG operator. Discuss the entire Marr - Hildrath edge detection algorithm. [6]

(b) What is thresholding? Discuss the basic global thresholding algorithm. [5]

OR

Q – 5 (a) Explain the Otsu's method for thresholding in detail. [6]

(b) Why smoothing is applied to image before finding the edges of the image? [2]

(c) Discuss the DoG operator. [3]

Q – 6 (a) Explain the freeman chain codes for representation. How it can be normalized? [6]

(b) Discuss the merging technique for representation. [2]

(c) Prove the duality property for the erosion and dilation operations. [2]

(d) Explain why two different thresholds are required in Canny's edge detection algorithm. [2]

1	0	4	0	1	(Q)
7	3	0	2	3	
0	1	2	1	7	
2	3	1	6	2	
(P) 1	0	5	1	0	

6	3	5	7
3	4	6	1
0	6	5	4
7	2	5	0
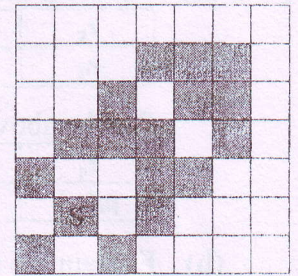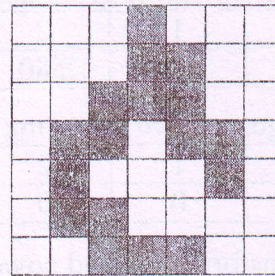
Fig. (a)   **Fig. (b)**   **Fig. (c)**   **Fig. (d)**

END OF PAPER