Seat No._____

GANPAT UNIVERSITY
M. Tech Sem. II Computer Engineering
Regular Examination April - June 2016
3CE201: Digital Image Processing

Max Time: 3 Hours]

[Max Marks: 60

Instructions: 1. Figures to the right indicate full marks of the question.
2. All questions are compulsory.
3. Each section should be written in a separate answer book.

SECTION: I

Q:1 (a) Perform the following of the given image using the given mask. Also [7]
discuss on the obtained result. Assume the same neighboring pixels
beyond the border.

$$A = \begin{bmatrix} 10 & 15 & 20 & 22 \\ 18 & 16 & 30 & 24 \\ 40 & 50 & 54 & 36 \\ 44 & 48 & 56 & 48 \end{bmatrix} \quad M = \frac{1}{9}\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$$

(b) Explain "Contrast stretching" in brief. [3]

OR

Q:1 (a) Perform the following of the given image using the given mask. Also [7]
discuss on the obtained result. Assume the same neighboring pixels
beyond the border.

$$A = \begin{bmatrix} 10 & 12 & 10 & 10 \\ 70 & 72 & 70 & 74 \\ 14 & 10 & 12 & 12 \\ 20 & 20 & 22 & 22 \end{bmatrix} \quad M = \begin{bmatrix} -1 & -2 & -1 \\ 0 & 0 & 0 \\ 1 & 2 & 1 \end{bmatrix}$$

(b) Explain Bit plane slicing in brief. [3]

Q:2 (a) Consider the following binary image segment. Show all possible 4- [8]
path, 8-path and m-path between the shaded pixels. Also Show the
shortest path. Compute the Euclidean and city block distance
between the shaded pixels. Assume the coordinates of top-left pixel
(1, 1) and bottom-right pixels as (5, 5).

$$\begin{bmatrix} 0 & 0 & 1 & 1 & \blacksquare \\ 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 1 \\ 1 & \blacksquare & 1 & 1 & 1 \end{bmatrix}$$

(b) Define magnitude and power spectrum of Fourier transform. [2]

OR

Q:2 (a) Explain the process of filtering in frequency domain step wise. [6]
(b) Derive the Fourier transform sampled function. [4]

Q:3 (a) Perform Histogram equalization on following 5x5, 3 bit image [7]
segment. Also obtain the histogram of the equalized image.

$$\begin{bmatrix} 2 & 2 & 0 & 1 & 1 \\ 3 & 3 & 2 & 4 & 1 \\ 2 & 1 & 2 & 3 & 4 \\ 1 & 2 & 3 & 3 & 1 \\ 2 & 3 & 1 & 1 & 3 \end{bmatrix}$$

(b) Suggest the probable algorithm for image recognition system which [3]
can distinguish/classify Indian Currency of 10 Rs and 20 Rs.

SECTION: II

Q:4 (a) What is convex hull? Explain the procedure to derive the convex [5]
hull.

(b) Extract the connected components for the image given in figure (A). [5]

OR

Q:4 (a) Discuss pruning process with suitable example. [5]

(b) Apply the region filling algorithm on the given figure (B). 'S' [5]
indicates the starting pixel for the procedure. Show each iteration in
separate figure.

Q:5 (a) Discuss the entire Marr - Hildrath edge detection algorithm. [5]

(b) What is non maxima suppression? Discuss how to find the direction [3]
in which non maxima suppression is applied.

(c) What is thresholding? Explain multiple thresholding. [2]

OR

Q:5 (a) Discuss the process of line detection using Hough transform. [5]

(b) Compare Canny edge detector with the Laplacian of Gaussian edge [3]
detector.

(c) Explain the zero crossing property. Discuss the merits of it. [2]

Q:6 (a) List out boundary representation schemes. Explain any two from it. [7]

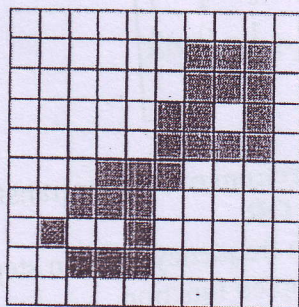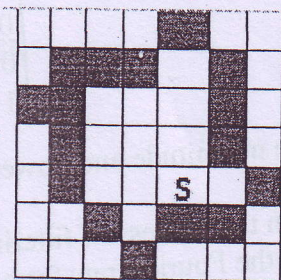(b) Explain boundary extraction algorithm with an example. [3]

Fig. (A)   Fig. (B)

------------------END OF PAPER------------------

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