Student Exam No: _____

GANPAT UNIVERSITY

B. TECH SEM. VII (COMPUTER ENGINEERING / INFORMATION TECHNOLOGY)

REGULAR EXAMINATION NOV-DEC – 2016

2CE704 / 2IT704 : FUNDAMENTALS OF 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) Consider the following image segment. Let V={2, 3, 4}. Compute the lengths of shortest 4, 8 and m-path between 'P' and 'Q'. If path doesn't exists, explain why. **[6]**

(P)

3	4	1	2	0
0	1	0	4	2
2	2	3	1	4
3	0	4	2	1
1	2	0	3	4

(Q)

(b) Explain how compression can be achieved using bit plane slicing. **[4]**

(c) Differentiate between radiance and luminance. **[2]**

OR

Q – 1 (a) Let P and Q be the pixels at coordinates (5, 5) and (10, 15) respectively. Find out which distance measure gives the minimum distance between the pixels. **[4]**

(b) Explain the following in brief: **[6]**
1. Log transformation 2. False contouring 3. High boost filtering

(c) Discuss one application for image averaging. **[2]**

Q – 2 (a) Consider the 8-level gray scale image of size 8x8 shown in fig. (A). Show the histogram of the image. Compute equalized histogram and display graphically. **[6]**

(b) Write a brief note on components of image processing system. **[5]**

OR

Q – 2 (a) Apply 3x3 median filter on the image shown in fig. (B) on page 2. **[6]**

(b) Differentiate among computer graphics, image processing, image analysis and computer vision. **[5]**

Q – 3 (a) How average intensity and intensity variance can be calculated using histogram statistics? Explain with proper example. **[4]**

(b) Discuss the following interpolation techniques: **[4]**
1. Nearest neighborhood interpolation.
2. Bicubic interpolation.

(c) Explain the effect of first order and second order derivatives on a step, ramp and constant intensity area of the image with proper example. **[4]**

SECTION – II

Q – 4 (a) Perform the following steps on the image shown in fig (C): [6]
Step - 1: Apply dilation with structuring element shown in fig. (D).
Step - 2: Apply erosion on the result of step - 1 with structuring element: [1 1 1; 1 1 1; 1 1 1]

(b) Explain the Otsu's method for thresholding in detail. [6]

OR

Q – 4 (a) What is the procedure to derive the skeleton? Derive skeleton for the image shown in fig. (E). [8]

(b) Explain the basic global thresholding algorithm. [4]

Q – 5 (a) According to Hough transform, discuss how to find whether some set of pixels lies on the same line or not. [6]

(b) Write the morphological equation for Hit-or-Miss transformation. Draw the structuring elements required to detect the end point of horizontal line, vertical line and line with +45 and -45 degree angle with x-axis. [5]

OR

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

(b) Discuss opening and closing morphological operation. Prove that they are dual of each other. [5]

Q – 6 (a) Discuss the following parameters as descriptors: [4]
1. diameter
2. curvature

(b) What is non-maxima suppression? How it can be performed? [4]

(c) Explain freeman chain code in short. [2]

(d) What will be the output of hole-filling algorithm, when the starting pixel is selected from one of the boundary pixel? [2]

----- X -----

0	1	1	0	0	1	1	0
0	1	2	3	3	2	1	0
0	4	5	3	3	5	4	0
0	1	2	7	7	2	1	0
0	1	2	6	6	2	1	0
0	4	5	3	3	5	4	0
0	1	2	3	3	2	1	0
0	1	1	0	0	1	1	0

Fig. (A)

3	6	5	2	4
0	6	1	6	1
2	4	7	3	0
3	6	5	6	2
1	0	2	1	4

Fig. (B)

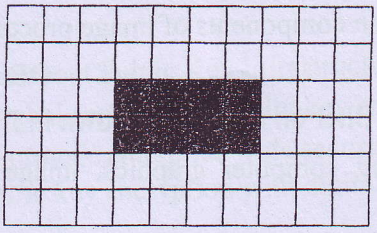

Fig. (C)

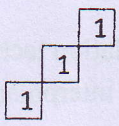

Fig. (D)

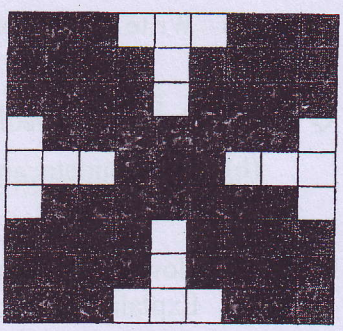

Fig. (E)

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