Student Exam No: _____

GANPAT UNIVERSITY

M. TECH. SEMESTER – II (COMPUTER ENGINEERING)

REGULAR EXAMINATION APRIL-JUNE – 2017

3CE201: DIGITAL IMAGE PROCESSING

Time: 3 hours **Total Marks: 60**

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) Explain the following terms with example: [3]
I. M-adjacency II. Digital path
III. Connected component

(b) Differentiate between point processing and mask processing. Explain any one point processing transformation. [3]

(c) Discuss the basic steps for applying filters in frequency domain. [4]

OR

Q – 1 (a) Explain the following terms: [2]
I. Contrast stretching II. False contouring

(b) Discuss about image sampling and quantization. [4]

(c) Show that the Fourier transform of the convolution of two functions in the spatial domain is equal to the product in the frequency domain of the Fourier transforms of those two functions. [4]

Q – 2 (a) Apply 3x3 median filter on the image shown in fig. (A) on page 2. [5]

(b) Consider the histogram values given below, for the 60 x 45, 3-bit image: [5]

r_k	0	1	2	3	4	5	6	7
n_k	203	256	524	229	545	312	499	132

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	0.16	0.33	0.27	0.24

OR

Q – 2 (a) Apply -4 centered laplacian mask on the image shown in fig. (B). [4]

(b) Find out values of Average Intensity and Intensity Variance using histogram statistics for the 4x4 image shown in fig. (C) on page 2. [4]

(c) Differentiate between convolution and correlation. When both will give same result? [2]

Q – 3 (a) Identify all necessary steps to implement a face recognition system based on image processing. Also classify those steps as low, mid or high level process. [3]

(b) Discuss the following grey-level transformations: [4]
I. Log transformation II. Power-law transformation

(c) Let P and Q be the pixels at coordinates (15, 25) and (25, 40) respectively. Find out which distance measure gives the minimum distance between the pixels. [3]

SECTION – II

Q – 4 (a) Extract the connected components from the image given in fig. (D) using morphological operation. 'S' indicates the starting point for the procedure. **[6]**

(c) Explain the probability density functions for following types of noise: **[4]**

I. Gaussian noise

II. Impulse noise

OR

Q – 4 (a) Derive the skeleton for the image shown in figure (E) on page 2. Show each step of the process. **[6]**

(b) Discuss the image degradation / restoration process model. **[4]**

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

(b) What is Hough transform? Discuss the entire process of Hough transform. **[5]**

OR

Q – 5 (a) What do you mean by multiple thresholding? Discuss the basic global thresholding algorithm. **[4]**

(b) Explain the entire process of canny's edge detection. **[6]**

Q – 6 (a) What is pruning? How it can be implemented using morphological image processing? **[3]**

(b) Derive the Laplacian-of-Gaussian filter. **[3]**

(c) Discuss chain codes for boundary representation. **[4]**

----- X -----

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. (A)

0	0	0	5	5
0	0	5	5	1
0	5	5	1	1
5	5	1	1	6
5	1	1	6	6

Fig. (B)

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

Fig. (C)

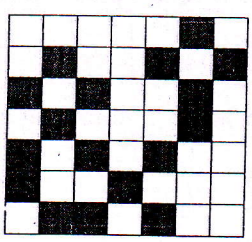

Fig . (D)

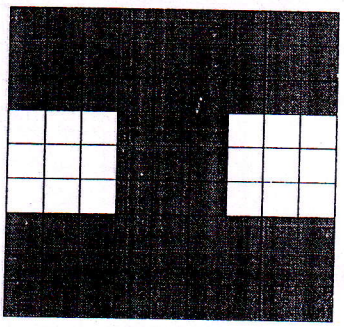

Fig . (E)

END OF PAPER