Student Exam No: _____

GANPAT UNIVERSITY

M. TECH SEMESTER - II (INFORMATION TECHNOLOGY)

REGULAR EXAMINATION APRIL – JUNE 2017

3IT201: FUNDAMENTALS OF 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) Define connectivity in digital Image processing. What is different between 8-connectivity and m-connectivity? **[3]**

(b) Give difference between Image sampling & quantization. **[3]**

(c) What are the fundamental steps in digital image processing? Explain it with diagram. **[4]**

OR

Q – 1 (a) What are the applications of images in Ultraviolet, X-ray and Infrared band? **[3]**

(b) Differentiate between Spatial Resolution & Intensity Resolution. **[3]**

(c) Find Shortest 4-path, 8-path and m-path between P and Q for the given image in Fig. (A) on page 2. Let V = {2, 3, 4}. **[4]**

Q – 2 (a) Consider the histogram values given below, for the 8 x 8, 3-bit image: **[5]**

r_k	0	1	2	3	4	5	6	7
n_k	8	10	10	2	12	16	4	2

For the above image, achieve following histogram specification.

z_q	0	1	2	3	4	5	6	7
n_q	0	0	0	0	20	20	16	8

(b) Discuss Ideal and Butterworth low pass filter for frequency domain. **[5]**

OR

Q – 2 (a) What are the characteristics of smooth image? Discuss the image smoothing filters in the spatial domain. **[5]**

(b) Find the Fourier Transform of the signal shown in Fig. (B) on page 2. **[5]**

Q – 3 (a) What are the applications of Image addition and Image subtraction? **[2]**

(b) What is Image Interpolation? List out types of Image Interpolation. **[2]**

(c) What is high boost filtering? Give the mask used for high boost filtering. **[2]**

(d) What is bit plane slicing? **[2]**

(e) What is Fourier Transform? List out properties of Fourier Transform. **[2]**

SECTION – II

Q – 4 (a) Explain Region Filling Algorithm with example. **[5]**

(b) What is difference between image enhancement and image restoration? Generate basic block diagram of restoration process and explain each block. **[5]**

OR

Q – 4 (a) Extract the connected components for the image given in Fig. (C) using structure element given in Fig. (D). 'S' indicates the starting point of the process. **[5]**

(b) Explain Noise models in detail. **[5]**

Q – 5 (a) Explain the method to detect the line in which polar form of the line equation is used. **[5]**

(b) Discuss the freeman chain codes for representation. How it can be normalized? **[5]**

OR

Q – 5 (a) Discuss canny's edge detection algorithm in detail. **[5]**

(b) How polygonal approximations are used in image representation? **[5]**

Q – 6 (a) Explain pruning process with proper example. **[4]**

(b) What is the zero crossing property? Discuss the merits of it. **[2]**

(c) What is role of multiple thresholding? **[2]**

(d) Explain duality property of erosion and dilation. **[2]**

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

Fig. (A)

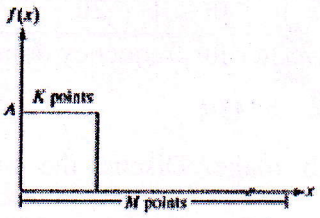

Fig. (B)

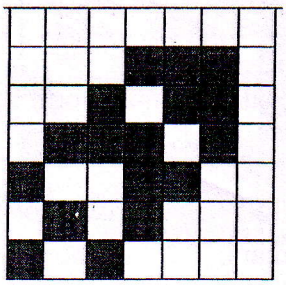

Fig. (C)

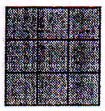

Fig. (D)

END OF PAPER