

Date: 28/11/2016.

Student's Enrollment No. _____

GANPAT UNIVERSITY
B. Tech. Sem. VII (EC)
Regular Examination Nov/Dec 2016
2EC706 (B): Digital Image Processing

Max. Time: 3 Hrs.]

[Max. Marks: 70

Instructions:

1. Attempt all questions.
2. Answers to the two sections must be written in separate answer books.
3. Figures to the right indicate full marks.
4. Assume suitable data, if necessary.

SECTION-I

- Q-1** (A) Explain with the help of experimental arrangement the image acquisition using the circular sensor. (4)
- (B) Compare JPEG, TIFF and GIFF image file formats with reference to features like number of bits, compression and animation. (4)
- (C) Draw and explain the isoperformance curve with reference to different images. (4)

OR

- Q-1** (A) What is aliasing effect? Explain with an appropriate example. (4)
- (B) Write a short note on properties of the 2D DFT. (4)
- (C) Draw and explain the block diagram of Homomorphic filtering. (4)
- Q-2** (A) Consider the following image A of size 4 x 4. Filter the image A using Sobel operator. (4)

10	12	8	16
11	8	10	9
16	11	10	14
9	14	8	15

- (B) Show that Laplacian operator is invariant to rotation. (4)
- (C) Perform the histogram linear stretching so that the new image has a dynamic range of [0,7] (4)

Grey Level	0	1	2	3	4	5	6	7
Number of Pixels	0	0	50	60	50	20	10	0

OR

- Q-2** (A) Equalize the following histogram (4)

Grey Level	0	1	2	3	4	5	6	7
Number of Pixels	790	1023	850	656	329	245	122	81

- (B) What effect would set to zero firstly the lower-order bit planes and secondly higher order bit planes have on the histogram of an image in general? (4)
- (C) List out the steps for filtering the image in the frequency domain. (4)
- Q-3** Consider the following image A of size 8 x 8 : (11)
- (i) Calculate & Plot the histogram of image A.
 - (ii) Calculate the mean and standard deviation of the histogram.
 - (iii) Stretch the image so that the mean and standard deviation of the new image are 20 and 2 respectively.

- (iv) Using the template $T = 1/9 [0 \ 1 \ 0 ; 1 \ 5 \ 1 ; 0 \ 1 \ 0]$, calculate the filtered image of A after performing zero padding.

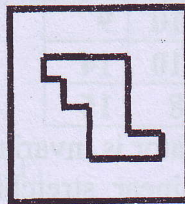
15	12	8	16	12	9	14	11
12	8	10	9	8	11	9	14
16	12	10	14	9	11	10	8
9	11	8	16	12	14	8	10
12	16	9	10	11	9	9	9
8	11	16	12	16	9	12	10
9	12	11	16	11	12	13	8
14	8	12	11	10	16	9	14

SECTION-II

- Q-4 (A) Explain with the block diagram the basic image compression scheme. (4)
 (B) Obtain the ternary Huffman code for the word 'COMMITTEE'. Also determine the average length, entropy and efficiency. (4)
 (C) Explain the block diagram of DPCM with quantizer. (4)

OR

- Q-4 (A) Explain the block diagram of DPCM without quantizer. (4)
 (B) Write a short note on transform based image coding scheme. (4)
 (C) Obtain the Binary Huffman code for the word 'ENGINEERING'. Also determine the average length, entropy and efficiency. (4)
 Q-5 (A) Classify the schemes for image segmentation and explain in brief. (4)
 (B) Segment the given arbitrary shape shown below by the quadtree approach. (4)



- (C) What is the common problem we face while transferring from spatial domain to frequency domain? How do we solve this problem? (4)

OR

- Q-5 (A) Write a short note on "Gray Level Transformation" using combined diagram. (4)
 (B) Apply the split and merge technique to segment the image shown below. (4)



- (C) Write a short note on various noise models. (4)
 Q-6 (A) Draw and explain the block diagram of 3 stage Wavelet de-composition. What are the advantages of Wavelet transform over other transforms. (6)
 (B) Define redundancy with respect to image, classify redundancy and explain them in detail. (5)

END OF PAPER