

GANPAT UNIVERSITY
B. Tech. Sem. VII (EC)
Regular Examination Nov/Dec 2012
EC 706: 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 single sensor. (4)
- (B) Explain with the help of block diagram the Components of a general-purpose image processing system. (4)
- (C) Consider the image segment shown. (a) Let $V = \{0,1\}$ and compute the lengths of the shortest 4-, 8-, and m-path between p and q. If a particular path does not exist between these two points, explain why. (b) Repeat for $V = \{1, 2\}$. (4)

3	1	2	1(q)
2	2	0	2
1	2	1	1
(p)1	0	1	2

OR

- Q-1 (A) Explain sampling theorem with the help of an example and also explain what would happen if it is not satisfied. (4)
- (B) Write a short note on properties of the 2D DFT. (4)
- (C) List out the steps for filtering in the frequency domain. (4)
- Q-2 (A) Consider the following image A of size 4 x 4. Filter the image A using Robert cross-gradient operator and Sobel operator. (6)

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

- (B) (1) What effect would setting to zero the lower-order bit planes have on the histogram of an image in general? (6)
- (2) What would be the effect on the histogram if we set to zero the higher order bit planes instead?

OR

Q-2 (A) Equalize the following histogram (6)

Grey Level	0	1	2	3	4	5	6	7
No. of Pixels	790	1023	850	656	329	245	122	81

(B) Show that Laplacian operator is invariant to rotation. (6)
Q-3 (A) Classify the image segmentation techniques. (6)
(B) Write a short note on edge based segmentation. (5)

SECTION-II

Q-4 (A) Define redundancy with respect to image, classify redundancy and explain them in detail. (6)
(B) Obtain the Huffman code for the word 'COMMITTEE'. Also determine the average length, entropy and efficiency. (6)

OR

Q-4 (A) Explain the block diagram of DPCM with quantiser. (6)
(B) Draw and explain the block diagram of baseline JPEG encoder and decoder. (6)
Q-5 (A) Explain with the help of flow chart, the hybrid region filling algorithm. (6)
(B) List and discuss the applications of image inpainting in detail. (6)

OR

Q-5 (A) Explain the steps of Panoramic Image creation with the help of simulink block diagram. (6)
(B) What is Bit plan slicing? Explain the same using an appropriate example of 5x5, 4 bit image. What is the use of bit plane slicing? (6)
Q-6 (A) Discuss the design of coder and decoder for video compression. (6)
(B) List out different video coding standards with their popular implementations. (5)

END OF PAPER