# GANPAT UNIVERSITY

## M. TECH. SEMESTER I (EC) REGULAR EXAMINATION- NOV/DEC 2014

## 3EC105: IMAGE & VIDEO PROCESSING

**Max. Time: 3 Hrs.]** **[Max. Marks: 60**

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.
5.

## SECTION-I

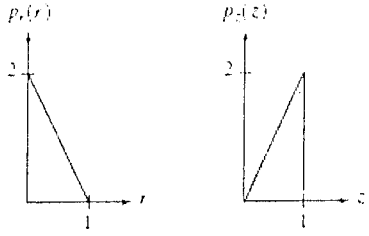
Q-1 (A) Perform the histogram linear stretching so that the new image has a dynamic range of [0,7] (5)

| Grey Level | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| No. of Pixels | 0 | 0 | 50 | 60 | 50 | 20 | 10 | 0 |

(B) Explain with the help of block diagram the Components of a general-purpose image processing system. (5)

**OR**

Q-1 (A) An image has the gray level PDF Pr(r) shown in the following diagram. It is desired to transform the gray levels of this image so that they will have the specified Pz(z) shown. Assume continuous quantities and find the transformation (in terms of r and z) that will accomplish this. (5)



(B) Explain Correspondence between Filtering in the Spatial and Frequency domain (5)

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. (5)

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

(B) Explain the concept of lossless predictive coding? (5)

**OR**

Q-2 (A) Show that Laplacian operator is invariant to rotation. (5)

(B) Explain Low pass Vs. Median Filtering stating the example. (5)

Q-3 (A) What will we obtain if the arithmetic mean filter is applied to an image again and again? What will happen if we use the median filter instead? (5)

(B) Give four important unitary image transforms. (5)

## SECTION-II

Q-4 (A) For the following colors in the RGB coordinated, determine their values in the YIQ and YUV coordinates, respectively. (5)
(a) (1, ,1, 1) (b) (0, 1, 0) (c) (1, 1, 0) (d) (0, 1 ,1)

(B) What are the pros and cons of progressive versus interlaced scans? For the same line number per frame, what is the relation between the maximum temporal frequency that a progressive raster can have and that of an interlaced raster that divides each frame into two fields? What about the relation between the maximum vertical frequencies? (5)

**OR**

Q-4 (A) For the following colors in the RGB coordinate, determine their values in the YCbCr coordinate. (5)
(a) (255, 255, 255) (b) (0, 255, 0) (c) (255, 255, 0) (d) (0, 255 ,255)

(B) Define image interpolation and explain its types in details. (5)

Q-5 (A) Describe the process of forming a composite color video signal. How should you select the color and audio subcarrier frequencies? (5)

(B) What are the pros and cons of using component versus composite formats? (5)

**OR**

Q-5 (A) Explain Bit-Plane Slicing with the help of an example. (5)

(B) Obtain the Huffman code for the word "**COMMITTEE**". Also determine its average length, Entropy and efficiency. (5)

Q-6 Encode and decode the following sequence using arithmetic coding. Use the occurrence frequency of each symbol in the sequence as the estimate of the probability of the symbol. (10)
Source sequence : a c b a a b a c a c b a
What is the bit rate of the coded sequence? Compare the result to scalar Huffman coding.

## END OF PAPER