Reg. No:……. **(Page-1)**

Name:……

Second Semester M.Tech. Degree Examination, 2014

Branch: COMPUTER SCIENCE AND ENGINEERING

RCE 2009: IMAGE PROCESING

Time: 3 Hours Max. Marks: 60

PART A

*Instructions: Answer **any tw**o and **all** question carries **equal** marks.*

I. Why do we need image processing? Briefly give an outline on different steps in image processing with the help of a block diagram. How will you represent an image in the form of a finite 2D matrix?

II. Define Sampling theory. How is the convolution process related with sampling theorem? A periodic signal is composed of 5 sine waves with frequencies of 100,300,500,700 and 900 Hz. What is the bandwidth of this signal? Draw the frequency spectrum, assuming all components have maximum amplitude of 10v.

III.

a. Show the effect of quantization error on the reconstructed signal with a neat diagram.

b. How will you define a connected region in an image? In the binary image below, S1 and S2 are subsets. Find if the subsets are 4,8,or m connected.

0 0 0 0 0 1 1 0
1 0 0 1 0 1 0 1
1 0 0 1 1 1 0 0
0 0 1 1 0 0 0 0
0 0 1 1 0 0 1 1

PART B

*Instructions: Answer **any tw**o and **all** question carries **equal** marks.*

IV.

a. Analyze the conditions that should be met for a set of orthogonal basis functions to be complete or closed. Describe the property to be followed for a basis vector to be orthogonal or orthonormal.

b. Analyze the role of perspective transformation in approximating the image formation.

V.

Histogram Equalization makes use of histogram to find out Transformation Function between an intensity level in the original image to intensity level in the processed image. Discuss with a good example. Mention the limitations of Histogram Equalization process.

VI.

a. Write down the Huffman encoding algorithm.

b. Compute the Huffman code and find out the average codeword length.

Symbol	S0	S1	S2	S3	S4	S5	S6
Probability	0.25	0.25	0.125	0.125	0.125	0.0625	0.0625

PART A

*Instructions: Answer **any two** and **all** question carries **equal** marks.*

VII. Explain Butterworth filter which is a better approximation of Ideal Low pass filter. Differentiate between Image Enhancement and Image restoration. Analyze the image degradation model.

VIII. What is image segmentation? Explain the basic approaches for segmenting an image?

IX. Differentiate between a line and an edge? Why second derivative operation is not normally used for edge detection? What is advantage of sobel operator over prewitt operator?

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