Code No: NR421203 **NR**

IV B.Tech II Semester Supplementary Examinations, Apr/May 2006
DIGITAL SPEECH & IMAGE PROCESSING
(Information Technology)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What do you understand by range images?
   (b) Explain an active range imaging technique.
   (c) Write a short note on range image registration. [4+6+6]

2. Given an image of size 3× 3 as shown below:

$$\begin{bmatrix} 0 & 0 & 2 \\ 5 & 1 & 2 \\ 0 & 3 & 4 \end{bmatrix}$$

   (a) What is transformation function of the histogram equalization.
   (b) What is the resultant output image after applying histogram equalization.
   (c) Draw the histogram of the input image and the image after applying histogram equalization. [5+5+6]

3. (a) Explain the characteristics of the following smoothing filters.
      i. Thresholding
      ii. averaging filters
      iii. median filters.
   (b) Discuss their relative advantages and disadvantages. [8+8]

4. The mean and standard deviation of the background pixels in the image shown are 110 and 15 respectively. The object pixels have mean and standard deviation values of 200 and 40 respectively. Give a thresholding solution for segmenting the objects of the image. [16]

5. Explain in detail how the Gradient and Laplacian operators are used in image segmentation applications. [16]

6. (a) List the principle applications of morphology.
   (b) Define Dilation and Erosion operations. Give examples
   (c) Let A and B are two sets ofZ^2 andΦ is the empty set, show that

$$A \oplus B = x/(B)_x \cap A \neq \Phi = \{c \subset Z^2/c = a + b \quad \text{for} \quad \text{some} \quad a \in A \text{and} b \in B\}$$

   [4+6+6]

7. (a) What do you mean by compression? Briefly explain its requirement.

(b) Differentiate lossy compression and lossless compression. Mention their applications.

(c) What do you mean by improved Gray Scale Quantization?

(d) Explain the fidelity criteria in image compression. [3+5+4+4]

8. What are the types of compression used in image application. Mention the requirements of compression. Briefly explain. [16]

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