Printed Pages : 2 **Roll No.** | | | | | | | | | | | **MTCS-052**

M. TECH.

THEORY EXAMINATION (SEM–II) 2016-17

DIGITAL IMAGE PROCESSING

Time : 3 Hours ***Max. Marks : 70***

Note : *Be precise in your answer. In case of numerical problem assume data wherever not provided.*

SECTION- A

1. Attempt all parts of this Section : **7×2=14**

(a) What is image processing and what are its aims?

(b) Explain image representation concepts.

(c) Explain region based segmentation.

(d) Briefly explain basic intensity transformations.

(e) Explain image sharpening using spatial domain method.

(f) Write an algorithm for region identification using 4N and 8N.

(g) Explain region decomposition, with a diagram.

SECTION- B

2. Attempt any three parts of the following : **3×7=21**

(a) Explain any two models of noise that can distort an image and two ways by which the quality of an image can be assessed.

(b) State the aim of and write an algorithm to perform histogram equalization.

(c) State the five criteria on which the design of Canny edge detector is based.

(d) Explain how erosion and dilation can be applied to a gray scale image.

(e) What do you mean by image segmentation? What are different image segmentation techniques? Describe texture segmentation technique.

SECTION- C

3. Attempt all questions in this section : **5×7=35**

(a) Describe the sequence of operations of a image processing system. Define and different light, luminance, brightness and contrast. Disccuss Mach Band effect.

OR

Draw the monochrome vision model and explain it. What do you mean by image fidelity criteria, explain in terms of subjective and quantitative measures?

(b) Discuss DCT (Discrete Cosine Transform) with the help of mathematical expressions. Enumerate the properties of discrete cosine transform.

OR

What do you mean by image restoration? Classify the image restoration techniques. A photogram is taken from a vehicle running at a speed of 100 km/hour. Is it possible to use a wiener or inverse filter to restore the blurring of the image?

(c) In a pattern recognition problem, feature vectors have two elements. Three class centers are given by (20, 20) T, (20,100) T, and (100, 20) T, respectively. Plot class centers in the features space. Find discriminating functions and draw corresponding boundaries between the classes considering Euclidean distance.

OR

How Principle Component Analysis is used for description of shape of any segmented region? Obtain the gray-level co-occurrence matrix of a 5×5 image composed of a check board of alternating 1's and 0's. This position operator P is defined as "one pixel to the right". Assume that the level pixel has value 0.

(d) Compare template matching and statistical method for image recognition. Explain any one method for image classification/recognitions.

OR

How color image filtering can be performed? Draw their block diagram and explain.

(e) Write the procedures for boundary extraction and region filling. Mention at least one real life application of both. What is the result of applying successive opening on the same set with the same structuring element?

OR

Why Hadamard Transform is most suitable for digital image processing? Discuss Hadamard Transform with the help of mathematical expression.