Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

(Constituent Institute of Manipal University)

SIXTH SEMESTER B.E DEGREE END SEMESTER EXAM-MAY/JUNE 2011

SUBJECT: ELECTIVE I – DIGITAL IMAGE ANALYSIS

(REVISED CREDIT SYSTEM)

TIME: 3 HOURS   MAX. MARKS: 50

INSTRUCTIONS TO CANDIDATES

- ANSWER ANY **FIVE** FULL QUESTIONS.
- ANSWER QUESTIONS IN ORDER.

---

1. A) What is image sampling and quantization?   (2 marks)
   B) Explain briefly the fundamental steps in Digital Image Processing with necessary illustrations and examples.   (6 marks)
   C) How is image averaging technique useful in image enhancement?   (2 marks)

2. A) Depict the curves of power-law (gamma) transformations for contrast manipulation. Propose values or range of values for gamma to obtain a high contrast image if the input image has (i) washed-out appearance (ii) predominantly dark appearance   (3+1+1 marks)
   B) Give the discrete form of histogram linearization transformation. When is histogram matching desirable? How does the histogram get affected if pixel intensity values within an image are shuffled?   (2+2+1 marks)

3. A) Explain and illustrate the mechanics of spatial filtering with an example.   (3 marks)
   B) Suggest an order-statistic spatial filter that removes salt and pepper noise in a digital image. Illustrate the filter with an example.   (1+2 marks)
   C) Give the expression for gradient operator and Laplacian operator. Discuss the effect of applying them in digital images by taking an image strip.   (1+3 marks)

4. A) Describe in detail the difference between filtering in frequency domain and spatial domain.
(3 marks)

   B) Illustrate and explain the basic steps for filtering in Fourier domain. (1+1 marks)

   C) Explain how illumination-reflectance model be used to develop a frequency domain procedure for improving the appearance of an image using homomorphic filtering.
(5 marks)

5. A) Depict a model of image degradation/restoration process. (2 marks)

   B) Discuss the probability density functions of Gaussian noise and Rayleigh noise when added to images. (4 marks)

   C) Discuss any two (i) polygonal approximation approaches for representing regions and (ii) regional descriptors. (4 marks)

6. A) Suggest and explain a best method to segment an image resulted from non-uniform illumination. (2 marks)

   B) What is opening and closing in morphological image processing? (3 marks)

   C) How can image segmentation be achieved using region splitting and merging? Explain with an example. (3 marks)

   D) Give a morphological algorithm to extract the boundary of an object in a binary image.
(2 marks)

ཨཨཨཨཨཨཨཨཨ