



Name :

Roll No. :

Invigilator's Signature :

CS/M.Tech(IT-SE)/SEM-3/MSE-303C/2011-12

2011

IMAGE PROCESSING AND PATTERN RECOGNITION

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer any *five* questions.

5 × 14 = 70

1. a) What is digital image processing ? 2
- b) Define pixel. What is meant by gray level ? 2 + 2
- c) Define chromatic and acromatic light. Classify chromatic light with respect to visible spectrum. 2 + 2
- d) Explain sampling and quantization. 4
2. a) What is meant by image enhancement ? What are the different techniques used in it ? 2 + 2
- b) How can you obtain digital negative ? Mention its application. 3 + 1
- c) Define contrast stretching. Explain contrast stretching technique. 1 + 5



3. a) What is neighborhood of a pixel and a mask ? 2 + 2
- b) What is noise in an image ? Classify filtering techniques in image processing. 2 + 2
- c) What is the function of low-pass and high-pass filtering ? Explain any one filtering techniques. 2 + 4
4. a) What is histogram ? Explain and draw the histogram of the following images :
- i) Dark image
- ii) Bright image
- iii) Low contrast image
- iv) High contrast image. 1 + 4
- b) Prove that probability density function is always uniform. 3
- c) Equalize the given histogram : 6

Gray level	0	1	2	3	4	5	6	7
Number of pixel	790	1023	850	656	329	245	122	81



5. a) What is segmentation ? 2
- b) Explain region extraction. 4
- c) What is edge detection ? Explain the following operators for edge detection : $2 + 3 \times 2 = 8$
- i) Roberts operator
 - ii) Prewitt operator
 - iii) Sobel operator.
6. a) What is the objective of feature selection and extraction of an image ? 3
- b) What do you mean by boundary of an object ? Explain. 4
- c) Explain unsupervised learning. 4
- d) What is clustering ? 3
7. a) What is meant by k-bit image ? 3
- b) Explain chess-board distance. 3
- c) Explain 4-adjacency and 8-adjacency. $2 + 2$
- d) Give the example of each, where the following imaging techniques are used : 4
- i) Gamma-ray imaging
 - ii) Ultraviolet imaging
 - iii) Microwave imaging
 - iv) Radio band imaging.