

Name :
Roll No. :
Invigilator's Signature :

CS/M.TECH(ECE-COMM)/SEM-2/MCE-205B/2012

2012

IMAGE PROCESSING & PATTERN RECOGNITION

Time Allotted : 3 Hours

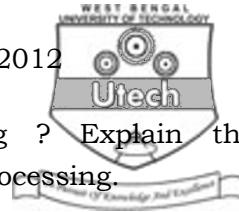
Full Marks : 70

The figures in the margin indicate full marks.

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

Answer Q. No. 1 and any *four* from the rest. $5 \times 14 = 70$

1. i) Discuss any two thresholding techniques used in image segmentation.
- ii) $X_s(t) = X(t) \text{comb}(t, \Delta t)$ $X_s(w) = X(w) * f(\text{comb}(t, \Delta t))$ — justify the statement.
- iii) What is the difference between orthogonality and orthonormality ?
- iv) Write the difference between image enhancement and image restoration.
- v) What is the drawback of wiener filter ?
- vi) What is the use of colour slicing ?
- vii) What is unsharp masking ?



- 2. a) What is digital image processing ? Explain the fundamental steps in digital image processing.
- b) Discuss the role of brightness adaption curve in human vision system.
- c) Define the following terms : 5 + 5 + 4
 - i) Gray level resolution
 - ii) Gaussian low pass filter.
- 3. a) Explain some of the widely used gray level transformations.
- b) What is an image histogram ? Explain histogram equalization technique for image enhancement.
- c) Perform histogram equalization of the image.

4	4	4	4	4
3	4	5	4	3
3	5	5	5	3
3	4	5	4	3
4	4	4	4	4

5 + 6 + 3

- 4. a) Explain the basic steps for filtering in the frequency domain.
- b) What is the need of image digitization ?
- c) Define spatial resolution.
- d) Explain the adjacency of pixel.
- e) Explain sampling theorem using Dirac-Delta function.

5 + 2 + 2 + 2 + 3



5. a) What is Pattern Recognition ?
b) Explain the different application of Pattern Recognition.
c) What are the different types of Pattern Recognition ?
d) Class W_1 consists of the 2D vectors $[0.2, 0.7]^T$, $[0.3, 0.3]^T$ and class W_2 of $[0.4, 0.6]^T$, $[0.6, 0.2]^T$. Design the classifier using Sum of Error Squares Method. 2 + 4 + 2 + 6
6. a) Define the process of image restoration. Explain the order statistics filter for restoring images in the presence of noise.
b) Explain the following methods to estimate the degradation function used in image restoration : 8 + 3 + 3
i) Estimation by image observation
ii) Estimation by mathematical modeling.
7. a) State and prove Baye's theorem as applied to pattern recognition.
b) What are the various types of distribution commonly employed in statistical decision making ?
c) With an example, write a note on confusion matrices. 5 + 4 + 5

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