



Name :

Roll No. :

Invigilator's Signature :

**CS/M.Tech(ECE)/SEM-2/MCE-205B/2012
2012**

IMAGE PROCESSING & PATTERN RECOGNITION

Time Allotted : 3 Hours

Full Marks : 70

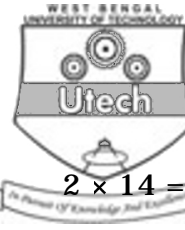
The figures in the margin indicate full marks.

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

GROUP – A

Answer *all* questions.

1. a) What is clustering ? Give one example of clustering. 2
- b) What do you mean by Character Recognition ? 2
- c) Write down the applications of Clustering. 3
- d) Why is “Backpropagation Algorithm” so called ? 2
- e) What is the difference between Sobel edge operator and Prewitt edge operator ? 3
- f) What is binary neighbourhood encoding ? 2



GROUP - B

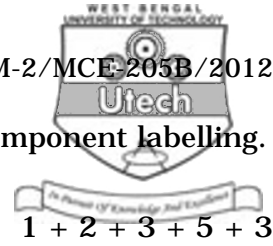
Answer any *two* of the following. $2 \times 14 = 28$

2. a) Explain the Perceptron Algorithm.
b) We have a discriminant line or decision line defined by $x_1 + x_2 - 0.5 = 0$, $\rho_t = 0.7$ that line classifies correctly all the vectors except $[0.4, 0.05]^T$ and $[-0.2, 0.75]^T$. Design a new classifier to classify all the vectors correctly. $6 + 8$
3. a) Explain the least square method.
b) What do you mean by “Reward and Punishment Method”? In a 2D space we have four points $(-1, 0)$ $(0, 1)$ belongs to class W_1 and points $(0, -1)$ $(1, 0)$ belongs to W_2 . Design a linear classifier using Perceptron Algorithm in its “Reward and Punishment Method” the parameter ρ is set equal to one and initial weight vector is chosen as $W(0) = [0, 0, 0]^T$. $6 + 8$
4. a) What are the targets of Back Propagation Algorithm?
b) Compute the Gradients of Back Propagation Algorithm.
c) What do mean by “Squashing Function”? $3 + 9 + 2$

GROUP - C

Answer any *two* of the following. $2 \times 14 = 28$

5. a) Explain Dirac delta function. Prove sampling theorem from Dirac delta function.
b) What is the connectivity of a gray level image?



- c) Explain the algorithm of connected component labelling.
- d) Explain adjacency of two pixel. $1 + 2 + 3 + 5 + 3$
6. a) What is translation operator ? Explain 2D translation.
- b) Derive the transformation matrix for 2D translation and 3D translation.
- c) Explain application of point operations.
- d) Explain Rate distortion theory.
- e) Explain City block distance and Chess board distance. $1 + 2 + 2 + 2 + 2 + 2 + 3$
7. a) What is skeletonization ? How do you obtain the skeleton of an image ?
- b) What is 8-neighbours of a pixel ?
- c) What is Erosion and Dilation of Morphological image processing ?
- d) Write short note on colour image processing.
- e) What is Histogram equalization ? $1 + 2 + 3 + 2 + 3 + 3$