

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2711

Roll No.

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**B.Tech.**

(SEM. VII) THEORY EXAMINATION 2011-12

**PATTERN RECOGNITION**

Time : 3 Hours

Total Marks : 100

Note :- (i) Attempt **all** questions.

(ii) Make suitable assumption if required.

1. Attempt any **two** parts : **(10×2=20)**

(a) What do you mean by pattern recognition ? Explain.

Describe design principles of pattern recognition system with an example.

(b) (i) What do you mean by learning and adaptation ? Explain.

(ii) Write short note on pattern recognition approaches.

(c) Explain the following and discuss their significance in pattern recognition with suitable example :

(i) Mean and Covariance

(ii) Chi Square Test.

2. Attempt any **two** parts : **(10×2=20)**
- (a) What is Bay's Theorem ? Explain. Also discuss Bay's Classifier using some example in detail.
- (b) What is a discriminant function ? Discuss it in detail. In a two class problem, the likelihood ratio is given as follows :  
$$p(x|C_1) / p(x|C_2)$$
  
Write the discriminant function in terms of the likelihood ratio.
- (c) Describe the following with suitable example :
- (i) Normal Density Function
- (ii) Utility Theory.
3. Attempt any **two** parts : **(10×2=20)**
- (a) What do you mean by dimension reduction ? Discuss Principal Component Analysis (PCA) algorithm for dimension reduction.
- (b) Write short notes on the following :
- (i) Maximum-Likelihood estimation.
- (ii) Expectation-maximization
- (c) Write a short note on Hidden Markov Model (HMM).
4. Attempt any **two** parts : **(10×2=20)**
- (a) What do you mean by fuzzy decision making ? Also discuss the fuzzy classification using suitable example.
- (b) Write an algorithm for K-Nearest neighbor estimation. Explain.

- (c) Write a short note on the following :
- (i) Parametric vs. non-parametric pattern recognition methods.
  - (ii) Parzen windows.

5. Write short notes on **two** of the following : **(10×2=20)**

- (a) What do you mean by supervised learning and unsupervised learning ? Explain. Discuss any unsupervised learning algorithm with some example.
- (b) What do you mean by clustering ? Explain. Discuss K-means clustering algorithm with suitable example.
- (c) Write short notes on the following :
  - (i) Clustering vs. classification
  - (ii) Cluster validation.