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P. Pages : 2

Time : Three Hours

**NIR/KW/18/3692**

Max. Marks : 80

- Notes :
1. All questions carry marks as indicated.
 2. Solve Question 1 OR Questions No. 2.
 3. Solve Question 3 OR Questions No. 4.
 4. Solve Question 5 OR Questions No. 6.
 5. Solve Question 7 OR Questions No. 8.
 6. Solve Question 9 OR Questions No. 10.
 7. Solve Question 11 OR Questions No. 12.
 8. Assume suitable data whenever necessary.
 9. Use of non programmable calculator is permitted.

1. a) Explain the design cycle of pattern recognition with the help of suitable diagram. 7
- b) Write short note on following. 6
- i) Learning and adaption.
 - ii) Pattern recognition approaches.

OR

2. a) What is pattern recognition? Explain design principles of pattern recognition with an example. 7
- b) Explain the various application of pattern recognition. 6
3. a) Explain Binomial distribution and Poisson distribution. 8
- b) Explain Random variable and conditional probability. 6

OR

4. a) Find the expected value and variance of uniform random variable with range a to b. 7
- b) A classifier has 30 percent error rate. What is the probability that exactly three error will be made in classifying 10 samples. 7
5. Explain following methods of errors estimates. 13
- i) Model based estimate.
 - ii) Simple Counting.
 - iii) Fractional Counting.

OR

6. a) Explain leaving-one-out and leaving-some-out technique in details. What for it is used? 6
- b) Give the proof for finding the optimal decision boundaries by using Bayes theorem. 7
7. a) Write short note on Artificial neural network. 6
- b) Explain Histogram and k-nearest neighbour technique. 7

OR

8. a) Explain Hidden Markov model in details. 6
- b) Give and explain adaptive decision boundary algorithm. 7
9. a) Explain support vector machine. 6
- b) Write Back-propagation algorithm in details. 7

OR

10. a) Explain following types of distances. 6
- i) Euclidean distance.
- ii) City block distance.
- b) Find the decision regions resulting from three discriminant function 7
- $$D_A = 1 + x + y$$
- $$D_B = 2 - x - 2y$$
- $$D_C = -3 - 2x - 4y$$
11. Perform hierarchical clustering of five samples using 14
- i) Words' Method.
- ii) Complete Linkage Algorithm.

Samples	1	2	3	4	5
X	4	8	15	24	24
Y	4	4	8	4	12

OR

12. a) Perform a partitional clustering using Forgy's Algorithm on the data shown below. 7
- {(4, 4), (8, 4), (15, 8), (24, 4), (24, 12)}.
- b) Perform a partitional clustering using K-means algorithm on the data given below. 7
- {(4, 4), (8, 4), (15, 8), (24, 4), (24, 12)}.



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The secret of getting ahead is getting started.

~ Mark Twain

