Course No.   : IS ZC464
Course Title   : MACHINE LEARNING
Nature of Exam   : Closed Book
Weightage   : 30%
Duration   : 2 Hours
Date of Exam   : 24/03/2019 (FN)

No. of Pages   = 1
No. of Questions = 4

Note:
1. Please follow all the *Instructions to Candidates* given on the cover page of the answer book.
2. All parts of a question should be answered consecutively. Each answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

Q.1.   Answer the following questions   [3 × 3 = 9]
   (a)   What is Pearson Correlation Coefficient? Explain.
   (b)   What do you understand by the remainder(A) for an attribute A in decision tree learning? Give an appropriate expression to compute the remainder(A) using feasible notations for training data.
   (c)   Explain Receiver Operating characteristic (ROC) curve and its significance in machine learning.

Q.2.   Answer the following questions   [2 × 3 = 6]
   (a)   What is the significance of a decision boundary in classification? Illustrate using an example.
   (b)   What is weighted K-nearest neighbor classification? Illustrate using an example.
   (c)   What do you understand by the dimensionality reduction. Illustrate using an example.

Q.3.   Consider the training data consisting of 10 2-D feature vectors belonging to two classes A and B. The data belonging to class A is <3,2>, <4,3>, <3,5>, <2,4>, <2.5, 3.5>, < 3.5, 4> and the data belonging to class B is <2.5, 2>, <3.5, 2.5>, <4,1>, <4,2>. Answer the following questions   [3 x 3 = 9]
   (a)   Is the data linearly separable? Explain why.
   (b)   Classify the testing point <3,2> using k-Nearest Neighbor classifier with k=3. Show all steps of computation.
   (c)   Classify the testing point   <2.5, 3> using *distance weighted* k-Nearest Neighbor classifier with k=5. Explain all steps of computation.

Q.4.   Consider the following training data with variables X1, X2 and X3 and the target class Y as described in the following table. Use Naive Bayes' classifier to classify whether a person who sleeps moderately between 6 to 8 hours, exercises 3 days a week but is not able to take good nutritional food, is healthy or not. Explain all steps of computation.   [6]

Sleep (X1)			Nutrition (X2)			Exercise (X3)			Healthy (Y)	
	yes	no		yes	no		yes	no	yes	no
Less than 4 hours (L)	4	6	Poor nutrition (P)	10	6	Once in a week (W1)	6	7	26	14
Moderate between 6 to 8 hours (M)	10	3	Good nutrition (G)	16	8	3 days a week (W3)	9	4		
Excess more than 9 hours (E)	12	5				6 days in a week (W6)	11	3		