JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION-2022

B.Tech- V Semester (ECE)

COURSE CODE (CREDITS): 20B1WEC532 (3)   MAX. MARKS: 35

COURSE NAME: Introduction to Machine Learning

COURSE INSTRUCTORS: Lt. Pragya Gupta   MAX. TIME: 2 Hours

Note: All questions are compulsory. Marks are indicated against each question in square brackets.

Q1. **(a)** What is IQR (Inter quartile range)? How is it measured?   **[2] (CO1 &2)**

   (b) Explain, in details, the different components of a box plot? Whenwill the lower whisker be longer than the upper whisker? Howcan outliers be detected using box plot?   **[3]**

Q2. (a) Define the following-

   (i)- Conditional Probability

   (ii)- Mutually Exclusive and Exhaustive events   **[2](CO 2)**

(b) In a toy-making shop, the automated machineproduces few defective pieces. It is observed that in a lot of1,000 toy parts, 25 are defective. If two random samples areselected for testing without replacement (meaning that the firstsample is not put back to the lot and thus the second sample isselected from the lot size of 999) from the lot, calculate theprobability that both the samples are defective.   **[3]**

Q3. Let us assume that we want to predict the outcome of a footballworld cup match on the basis of the past performance data of the playingteams. We have training data available in the given table for actual matchoutcome, while four parameters are considered – Weather Condition (Rainy,Overcast, or Sunny), how many matches won was by this team out of the lastthree matches (one match, two matches, or three matches), HumidityCondition (High or Normal), and whether they won the toss (True or False).Using Naïve Bayesian, you need to classify the conditions when this teamwins and then predict the probability of this team winning a particular matchwhen Weather Conditions = Overcast, they won two of the last three matches,Humidity = High and they won the toss in the particular match.   **[7] (CO 5)**

Weather Condition	Wins in last 3 matches	Humidity	Win toss	Won match?
Rainy	3 wins	High	FALSE	No
Rainy	3 wins	High	TRUE	No
OverCast	3 wins	High	FALSE	Yes
Sunny	2 wins	High	FALSE	Yes
Sunny	1 win	Normal	FALSE	Yes
Sunny	1 win	Normal	TRUE	No
OverCast	1 win	Normal	TRUE	Yes
Rainy	2 wins	High	FALSE	No
Rainy	1 win	Normal	FALSE	Yes
Sunny	2 wins	Normal	FALSE	Yes
Rainy	2 wins	Normal	TRUE	Yes
OverCast	2 wins	High	TRUE	Yes
OverCast	3 wins	Normal	FALSE	Yes
Sunny	2 wins	High	TRUE	No

Q4. What is a decision tree? Discuss the decision tree algorithm in detail. What are the strengths and weaknesses of the decision tree method? **[1+3+2] (CO3)**

Q5. (a) Write the algorithm for kNN. **[2] (CO 4)**

(b)Let us consider a very simple Student data set as depicted inFigure 7.4. It consists of 15 students studying in a class. Eachof the students has been assigned a score on a scale of 10 ontwo performance parameters – 'Aptitude' and'Communication'. Also, a class value is assigned to eachstudent based on the following criteria:

1. Students having good communication skills as well as a good level ofaptitude have been classified as 'Leader'
2. Students having good communication skills but not so good level ofaptitude have been classified as 'Speaker'
3. Students having not so good communication skill but a good level ofaptitude have been classified as 'Intel' **[5]**

Name	Aptitude	Communication	Class
Karuna	2	5	Speaker
Bhuvna	2	6	Speaker
Gaurav	7	6	Leader
Parul	7	2.5	Intel
Dinesh	8	6	Leader
Jani	4	7	Speaker
Bobby	5	3	Intel
Parimal	3	5.5	Speaker
Govind	8	3	Intel
Susant	6	5.5	Leader
Gouri	6	4	Intel
Bharat	6	7	Leader
Ravi	6	2	Intel
Pradeep	9	7	Leader
Josh	5	4.5	Intel

Suppose we have a new student named Arpit. He has a communication score of 6 and an aptitude score is 3. Find out in which class does Arpit belong? Choose the best value of K.

Q6. With an example Discuss the Bayesian Belief Network in detail. **[5] (CO3)**