

Name:

Enrolment No:



**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES, DEHRADUN**

**Online End Semester Examination, May 2021**

Course: AI and ML in Science

Semester: II

Program: MSc (Chemistry)

Time: 03 hrs

Course Code: CSAI 7010

Max. Marks: 100

**Section A**

1. Each question will carry 5 marks

2. Instruction: Complete the statement / Select the correct answer(s)

S. No.	Question	CO
Q1	(a) The Turing test was developed by _____ in the year _____. (b) The term Artificial Intelligence was first introduced by _____ in the year _____.	CO1
Q2	(a) Two coins are tossed. If Y represents the number of tails, what is $P(Y = 1)$ ? (b) Four coins are tossed. If X represents the number of heads, what is $P(X = 2)$ ?	CO1
Q3	(a) The cognitive science is a highly interdisciplinary field, combining ideas and methods majorly from six disciplines. Write down the names of each of the six disciplines. (b) Write down the formula for the Probability of a given event A given that B has occurred. $P(A/B) = ?$	CO1
Q4	(a) A random variable X is said follow Gaussian Distribution with parameters Mean and Standard Distribution if the probability density function of X is (b) Two cubical dice are thrown and their scores added together. If X = "The sum of the scores on the two dice", what is $P(X \text{ is divisible by } 4)$ ?	CO2
Q5	(a) Four coins are tossed. If Y represents the number of tails, what is $P(Y \leq 1)$ ? (b) Two dice are thrown and their scores added together. If X = "The sum of the scores on the two dice", what is $P(X = 7 \text{ or } 8)$ ?	CO2
Q6	The heights of five dogs are: 600mm, 470mm, 170mm, 430mm and 300mm.  Find out the Mean, the Variance, and the Standard Deviation.	CO2

**SECTION B**

1. Each question will carry 10 marks

2. Instruction: Write short / brief notes

Q1	What are the data preparation challenges? Explain with proper examples	CO1
Q2	What is machine learning? How people are misusing the abilities of machine learning? Explain with proper examples.	CO2

Q3	Explain the term Abstraction and Knowledge representation in machine learning.	CO1
Q4	Briefly explain the data preparation process. What is the importance of data normalization in the data preparation process? Explain with proper formulation and suitable example.	CO2
Q5	Explain the term bias and variance. Explain the significance of bias and variance in machine learning.	CO2

**SECTION C**

**1. Each Question carries 20 Marks.**

**2. Instruction: Write long answer.**

**3. Attempt any one question.**

**4. Marks will be provided for the steps. No marks will be provided for skipping the steps and directly writing the answers.**

<b>Q1</b>	<p><b>Part 1:</b> Explain the following terms:  (a) True Positive, (b) False Positive, (c) True Negative, (d) False Negative, (e) Accuracy, (f) Precision, and (j) Recall.</p> <p><b>Part 2:</b> Suppose a machine learning algorithm is learned to classify the input samples into two classes: <b>Class A</b> and <b>Class B</b>. Suppose there are <b>2000</b> samples are tested using the given machine learning algorithm. Now following information is given</p> <ol style="list-style-type: none"> <li>Out of <b>2000</b> samples, <b>1150</b> samples belongs to class A.</li> <li><b>900</b> samples are correctly classified as Class A</li> <li><b>750</b> Samples are correctly classified as Class B</li> </ol> <p><b>Now calculate the values of each seven terms provided in the part1 of this question.</b></p>	CO2
-----------	--	-----

<b>Q2</b>	<p><b>Part 1:</b> Explain the K-nearest neighbours' algorithm with each steps clearly. What are the advantages and limitations of the K-NN Algorithms ?</p> <p><b>Part 2:</b> Solve the following question using K-nearest neighbour algorithm.  Find out the prediction of sport for the input <b>Angelina</b> using the data provided in the table below. Write down each and every step and calculation clearly. The value for <b>K = 3</b>.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Name</th> <th>Age</th> <th>Gender</th> <th>Sport</th> </tr> </thead> <tbody> <tr><td>Ajay</td><td>32</td><td>M</td><td>Football</td></tr> <tr><td>Mark</td><td>40</td><td>M</td><td>None</td></tr> <tr><td>Sara</td><td>16</td><td>F</td><td>Cricket</td></tr> <tr><td>Zaira</td><td>34</td><td>F</td><td>Cricket</td></tr> <tr><td>Sachin</td><td>55</td><td>M</td><td>None</td></tr> <tr><td>Rahul</td><td>40</td><td>M</td><td>Cricket</td></tr> <tr><td>Pooja</td><td>20</td><td>F</td><td>None</td></tr> <tr><td>Smith</td><td>15</td><td>M</td><td>Cricket</td></tr> <tr><td>Lakshmi</td><td>55</td><td>F</td><td>Football</td></tr> <tr><td>Michel</td><td>15</td><td>M</td><td>Football</td></tr> <tr> <td><b>Angelina</b></td> <td><b>5</b></td> <td><b>F</b></td> <td><b>??</b></td> </tr> </tbody> </table>	Name	Age	Gender	Sport	Ajay	32	M	Football	Mark	40	M	None	Sara	16	F	Cricket	Zaira	34	F	Cricket	Sachin	55	M	None	Rahul	40	M	Cricket	Pooja	20	F	None	Smith	15	M	Cricket	Lakshmi	55	F	Football	Michel	15	M	Football	<b>Angelina</b>	<b>5</b>	<b>F</b>	<b>??</b>	CO2
Name	Age	Gender	Sport																																															
Ajay	32	M	Football																																															
Mark	40	M	None																																															
Sara	16	F	Cricket																																															
Zaira	34	F	Cricket																																															
Sachin	55	M	None																																															
Rahul	40	M	Cricket																																															
Pooja	20	F	None																																															
Smith	15	M	Cricket																																															
Lakshmi	55	F	Football																																															
Michel	15	M	Football																																															
<b>Angelina</b>	<b>5</b>	<b>F</b>	<b>??</b>																																															

**End**