Code No: **R1941053** **R19** **Set No. 1**

IV B.Tech I Semester Advance Supplementary Examinations, March - 2023

MACHINE LEARNING

(Common to Computer Science & Engineering and Information Technology)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
ONE Question from Each unit
All Questions Carry Equal Marks
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UNIT I

1 a) What is target function? How do you determine the target function? Explain with the help of an example. [7]

b) Consider a hypothesis space defined over the instances given in the following table. Give a trace of CANDIDATE-ELIMINATION algorithm learning from these instances and show G and S boundaries.

Example	*Sky*	*AirTemp*	*Humidity*	*Wind*	*Water*	*Forecast*	*EnjoySport*
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Change	No
4	Sunny	Warm	High	Strong	Cool	Change	Yes

[8]

(OR)

2 a) Explain the intuition behind the Least Mean Square Error (LMS) with the help of an example and Describe an algorithm to learn the optimal weights to minimize LMS. [7]

b) Explain the fundamental property of inductive inference with the help of an example. Also discuss the advantages of inductive inference. [8]

UNIT II

3 a) Consider the training examples given in the following table. Using ID3 find the best attribute for the root node of the decision tree. Take a threshold of 80K for 'Taxable Income' attribute and covert the continuous values into two categorical values.

Tid	Refund	Marital Status	Taxable Income	Cheat
1	Yes	Single	125K	No
2	No	Married	100K	No
3	No	Single	70K	No
4	Yes	Married	120K	No
5	No	Divorced	95K	Yes
6	No	Married	60K	No
7	Yes	Divorced	220K	No
8	No	Single	85K	Yes
9	No	Married	75K	No
10	No	Single	90K	Yes

[8]

b) Explain the different ways of handling continuous attributes in decision tree learning. [7]

(OR)

4 a) Why are shorter decision trees preferred over longer ones? [7]

b) How noise in the data leads to an overfitting problem? Explain with the help of an example. [8]

UNIT III

5 a) Illustrate Vapnik-Chervonenkis dimension with the help of example. [7]

b) Discuss FOIL rule-based learning algorithm with the help of an example. [8]

(OR)

6 a) Discuss about First-Order rule learning in detail. [7]

b) Explain the concepts of Probably Approximately Correct (PAC) learnability and PAC criterion. [8]

UNIT IV

7 a) Explain how SVM handles non-linearly separable data. [7]

b) Explain back-propagation algorithm with the help of an example. Take error function of your choice. [8]

(OR)

8 a) Explain the motivation behind using Neural Networks rather than the Logistic Regression model. [7]

b) Discuss SVM optimization problem and the concept of duality. [8]

UNIT V

9 a) Given the following training data, classify a new instance X_{new} = *(age>40, Income = high, Student = yes, Credit rating = fair)* using the Naive-Bayes classifier.

Age	Income	Student	Credit rating	Buys compter ?
≤ 30	high	no	fair	no
≤ 30	high	no	excellent	no
30 . . . 40	high	no	fair	yes
> 40	medium	no	fair	yes
> 40	low	yes	fair	yes
> 40	low	yes	excellent	no
31 . . . 40	low	yes	excellent	yes
≤ 30	medium	no	fair	no
≤ 30	low	yes	fair	yes
> 40	medium	yes	fair	yes
≤ 30	medium	yes	excellent	yes
31 . . . 40	medium	no	excellent	yes
31 . . . 40	high	yes	fair	yes
> 40	medium	no	excellent	no

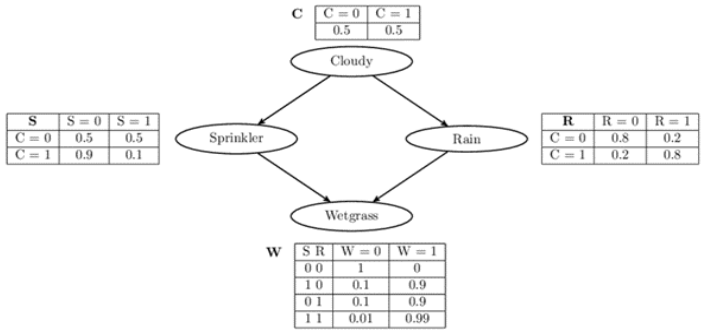
[8]

b) Explain the gradient descent algorithm for the logistic regression model. [7]

(OR)

10 a) Describe the Naive Bayesian method of classification and assumptions that the method makes. [7]

b) Consider the following Bayesian network. Suppose you observe it is cloudy and raining. What is the probability that the gross is wet?



[8]