



# MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AN AUTONOMOUS INSTITUTION)

(Approved by AICTE, New Delhi &amp; Affiliated to JNTUH, Hyderabad)

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III B.Tech II Sem Regular End Examination, June 2022

## Machine Learning (Computer Science and Engineering)

Time: 3 Hours.

Max. Marks: 70

Note: 1. Question paper consists: Part-A and Part-B.

2. In Part – A, answer all questions which carries 20 marks.

3. In Part – B, answer any one question from each unit.

Each question carries 10 marks and may have a, b as sub questions.

## PART- A

(10\*2 Marks = 20 Marks)

1. a) Compare Entropy and Information Gain. 2M C01 BL2
- b) What is the inductive bias of decision trees? 2M C01 BL1
- c) Discuss the Perceptron training rule. 2M C02 BL2
- d) State the conditions in which Gradient Descent is applied. 2M C02 BL1
- e) What are Consistent Learners? 2M C03 BL2
- f) Explain conditional Independence with an example. 2M C03 BL2
- g) Write the steps for Sequential Covering algorithm. 2M C04 BL1
- h) When does a temporal difference error occur? 2M C04 BL1
- i) Define Explanation based learning. 2M C05 BL1
- j) Compare Inductive and analytical learning. 2M C05 BL2

## PART- B

(10\*5 Marks = 50 Marks)

2. a) How is Candidate Elimination algorithm different from Find-S algorithm? 5M C01 BL2
- b) Trace the Candidate Elimination Algorithm for the hypothesis space 'H' 5M C01 BL3  
given the sequence of training tuples from the below table  
 $H' = \langle ?, \text{Cold}, \text{High}, ?, ?, ? \rangle \vee \langle \text{Sunny}, ?, \text{High}, ?, ?, \text{Same} \rangle$

| S No | Sky   | Air Temp | Humidity | Wind   | Water | Fore cast | Enjoy Sport |
|------|-------|----------|----------|--------|-------|-----------|-------------|
| 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         |

OR

|           |  |     |     |     |
|-----------|--|-----|-----|-----|
| 3         | Discuss in detail about Hypothesis Space Search in Decision tree Learning.   | 10M | C01 | BL2 |
| 4         | a) Illustrate Back propagation algorithm with an example.  | 5M  | C02 | BL3 |
|           | b) Derive the Back propagation rule considering the training rule for Output Unit weights and Training Rule for Hidden Unit weights.   | 5M  | C02 | BL3 |
| <b>OR</b> |  |     |     |     |
| 5         | Describe the Stochastic Gradient Descent version of the Back Propagation algorithm for feed forward networks containing two layers of sigmoid units.   | 10M | C02 | BL2 |
| 6         | a) Define MAP hypothesis. Derive the relation for hMAP using Bayesian theorem.   | 5M  | C03 | BL6 |
|           | b) Consider a medical diagnosis problem in which there are two alternative hypotheses: 1. That the patient has a particular form of cancer (+) and 2. That the patient does not (-). A patient takes a lab test and the result comes back positive. The test returns a correct positive result in only 98% of the cases in which the disease is actually present, and a correct negative result in only 97% of the cases in which the disease is not present. Furthermore, .008 of the entire population have this cancer. Determine whether the patient has Cancer or not using MAP hypothesis. | 5M  | C03 | BL3 |
| <b>OR</b> |  |     |     |     |
| 7         | Define Bayesian theorem? What is the relevance and features of Bayesian theorem? Explain the practical difficulties of Bayesian theorem.   | 10M | C03 | BL4 |
| 8         | a) Define First Order Logic. Describe the learning sets of First Order rules: FOIL.  | 5M  | C04 | BL2 |
|           | b) Elucidate the concept of temporal difference learning with examples.  | 5M  | C04 | BL2 |
| <b>OR</b> |  |     |     |     |
| 9         | Explain the Q function and Q Learning Algorithm assuming deterministic rewards and actions with example.   | 10M | C04 | BL2 |
| 10        | a) Explain the inductive analytical approaches to learning.  | 5M  | C05 | BL2 |
|           | b) How to use prior knowledge to initialize the hypothesis?  | 5M  | C05 | BL1 |
| <b>OR</b> |  |     |     |     |
| 11        | How to Augment Search operators using prior knowledge? Explain.  | 10M | C05 | BL4 |