USN ☐☐☐☐☐☐☐☐☐☐ 　　　　　　　　　　**15EC834**

# Eighth Semester B.E. Degree Examination, July/August 2022
## Machine Learning

Time: 3 hrs. 　　　　　　　　　　　　　　　　　　　Max. Marks:80

**Note:** *Answer any FIVE full questions, choosing ONE full question from each module.*

## Module-1

1 a. Describe the following problems with respect to tasks, performance and experience :
　　i) A checkers learning problem
　　ii) A handwritten recognition learning problem
　　iii) A robot driving learning problem. 　　　　　　　　　　　　　**(07 Marks)**
　b. Write candidate elimination algorithm and illustrate with example. 　**(09 Marks)**

### OR

2 a. Explain the steps in designing learning systems in detail. 　　　　**(06 Marks)**
　b. Write FIND-S algorithm and explain by taking EnjoySport concept and training instance given below :

| Example | SKY | Air Temp | Humidity | Wind | Water | Forecast | 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 |

　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**(10 Marks)**

## Module-2

3 a. What is the procedure of building Decision Tree using ID3 algorithm with Gain and Entropy. Illustrate with example. 　　　　　　　　　　　　　**(10 Marks)**
　b. Draw the perceptor network with notation. Derive an equation of gradient descent rule to minimize the error. 　　　　　　　　　　　　　　　　　**(06 Marks)**

### OR

4 a. Explain Back propagation algorithm in detail. 　　　　　　　　　**(09 Marks)**
　b. What are the issues in Decision tree learning? How they are overcome? 　**(07 Marks)**

## Module-3

5 a. Briefly describe the Bayes theorem and maximum a posteriori (MAP) hypothesis. **(04 Marks)**
　b. Derive equation for MAP hypothesis using Bayes theorem. 　　　　**(04 Marks)**
　c. Consider a football game between two rival teams: Team0 and Team1. Suppose Team0 wins 95% of the time and Team1 wins the remaining matches. Among the games won by team0, only 30% of them come from playing on team '1's football field. On the other hand, 75% of the victories for team1 are obtained while playing at home. If team1 is to host the next match between the two teams, which team will most likely emerge as the winner? 　**(08 Marks)**

### OR

6 a. Explain Naïve Bayes classifier and Bayseian belief networks. 　　　**(10 Marks)**
　b. Show that how maximum likelihood (Bayesian learning) can be used in any learning algorithms that are used to minimize the squared error between actual output hypothesis and predicted output hypothesis. 　　　　　　　　　　　　　**(06 Marks)**

## Module-4

| 7 | a. | Discuss the K-nearest neighbor learning. | (04 Marks) |
|---|---|---|---|
| | b. | Discuss locally weighted regression. | (04 Marks) |
| | c. | Explain the CADET system using case based reasoning. | (08 Marks) |

**OR**

8  a.  Define the following terms with respect to K-nearest neighbor learning.
   i)   regression
   ii)  residual
   iii) kernel function. **(03 Marks)**
   b.  Explain radial basis functions. **(05 Marks)**
   c.  Explain the FOIL algorithm. **(08 Marks)**

## Module-5

| 9 | a. | Illustrate PROLOG – EBG algorithm with an example. | (07 Marks) |
|---|---|---|---|
| | b. | Discuss Inductive – Analytical approaches to learning. | (09 Marks) |

**OR**

10  a.  Compare the essential difference between analytical and inductive learning methods.
   **(08 Marks)**
   b.  Elucidate the FOCL algorithm. **(08 Marks)**

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