



# CBCS SCHEME

15EC834

USN

## Eighth Semester B.E. Degree Examination, Aug./Sept.2020 Machine Learning

Time: 3 hrs.

Max. Marks: 80

- Note:** i) For Regular Students: Answer any FIVE full questions irrespective of modules.  
ii) For Arrear Students : Answer any FIVE full questions, choosing ONE full question from each module.

### Module-1

- 1 a. Define machine learning. Describe the steps in designing learning system. (08 Marks)
- b. Write candidate-elimination algorithm and illustrate with an example. (08 Marks)
- 2 a. Describe FIND-S algorithm. Explain it by considering the training instance of Enjoy Sport given in Table.Q2(a).

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

Table.Q2(a)

(10 Marks)

- b. Describe the following problems with respect to tasks, performance and experience.
  - (i) A checkers learning problem
  - (ii) Hand-written recognition learning problem
  - (iii) A robot driving learning problem. (06 Marks)

### Module-2

- 3 a. With the help of an example, describe ID3 algorithm for decision tree learning. (08 Marks)
- b. What is decision tree? Describe its use for classification with an example. (08 Marks)
- 4 a. For the transaction shown in the Table.Q4(a), compute:
  - (i) Entropy of the collection of transaction records of table with respect to classification.
  - (ii) What are the information gain of  $a_1$  and  $a_2$  relative to the transactions of the table?

Instance	1	2	3	4	5	6	7	8	9
$a_1$	T	T	T	F	F	F	F	T	F
$a_2$	T	T	F	F	T	T	F	F	T
Target class	+	+	-	+	-	-	-	+	-

the Table.Q4(a)

(08 Marks)

- b. How a single perceptron can be used to represent the Boolean functions such as AND and OR? (08 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)

- 6 a. Explain Naïve Bayes classifier and Bayesian 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. Explain CADET system using case based reasoning. (08 Marks)  
b. Explain K-nearest neighbor algorithm. (05 Marks)  
c. Define the following terms with respect to K-nearest neighbor learning:  
(i) Regression  
(ii) Residual  
(iii) Kernel function (03 Marks)
- 8 a. Explain FOIL algorithm. (08 Marks)  
b. Briefly describe locally weighted regression. (04 Marks)  
c. Explain radial basis functions. (04 Marks)

**Module-5**

- 9 a. Explain FOCL algorithm with an example. (10 Marks)  
b. Explain reinforcement learning problem with necessary diagram. (06 Marks)
- 10 a. Explain Q-learning algorithm assuming deterministic reward and action with example. (10 Marks)  
b. List the reinforcement problem characteristics. (06 Marks)

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