CBCS SCHEME

USN | 1 | A | 4 | 1 | 6 | C | S | 0 | 6 | 6 |

15CS73

Seventh Semester B.E. Degree Examination, Dec.2019/Jan.2020
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. What do you mean by well-posed learning problem? Explain with example. **(04 Marks)**

b. Explain the various stages involved in designing a learning system in brief. **(08 Marks)**

c. Write Find_S algorithm and discuss the issues with the algorithm. **(04 Marks)**

OR

2 a. List the issues in machine learning. **(04 Marks)**

b. Consider the given below training example which finds malignant tumors from MRI scans.

Example	Shape	Size	Color	Surface	Thickness	Target concept
1	Circular	Large	Light	Smooth	Thick	Malignant
2	Circular	Large	Light	Irregular	Thick	Malignant
3	Oval	Large	Dark	Smooth	Thin	Benign
4	Oval	Large	Light	Irregular	Thick	Malignant
5	Circular	Small	Light	Smooth	Thick	Benign

Show the specific and general boundaries of the version space after applying candidate elimination algorithm. (Note: Malignant is +ve, Benign is –ve). **(08 Marks)**

c. Explain the concept of inductive bias in brief. **(04 Marks)**

Module-2

3 a. Discuss the two approaches to prevent over fitting the data. **(08 Marks)**

b. Consider the following set of training examples:

Instance	Classification	a_1	a_2
1	1	1	1
2	1	1	1
3	0	1	0
4	1	0	0
5	0	0	1
6	0	0	1

(i) What is the entropy of this collection of training examples with respect to the target function classification?

(ii) What is the information gain of a_2 relative to these training examples? **(08 Marks)**

OR

4 a. Define decision tree. Construct the decision tree to represent the following Boolean functions:

i) $A \wedge \neg B$ ii) $A \vee [B \wedge C]$ iii) A XOR B **(06 Marks)**

b. Write the ID3 algorithm. **(06 Marks)**

c. What do you mean by gain and entropy? How it is used to build the decision tree. **(04 Marks)**

Module-3

5 a. Define perceptron. Explain the concept of single perceptron with neat diagram. **(06 Marks)**

b. Explain the back propagation algorithm. Why is it not likely to be trapped in local minima? **(10 Marks)**

OR

6 a. List the appropriate problems for neural network learning. **(04 Marks)**

b. Discuss the perceptron training rule and delta rule that solves the learning problem of perceptron. **(08 Marks)**

c. Write a remark on representation of feed forward networks. **(04 Marks)**

Module-4

7 a. Explain Naïve Bayes classifier. **(08 Marks)**

b. Explain brute force MAP learning algorithm. **(08 Marks)**

OR

8 a. Discuss Minimum Description Length principle in brief. **(08 Marks)**

b. Explain Bayesian belief networks and conditional independence with example. **(08 Marks)**

Module-5

9 a. Define: (i) Simple Error (ii) True Error **(04 Marks)**

b. Explain K-nearest neighbor learning algorithm. **(08 Marks)**

c. What is reinforcement learning? **(04 Marks)**

OR

10 a. Define expected value, variance, standard deviation and estimate bias of a random variable. **(04 Marks)**

b. Explain locally weighted linear regression. **(08 Marks)**

c. Write a note on Q-learning. **(04 Marks)**

* * * * *