(b) What is parameter learning? 3

(c) Explain expectation maximization problem. 4

(d) Define statistical learning. 2

## UNIT - IV

7. (a) What is reinforcement learning? How does it differ with other machine learning techniques? 4

(b) What is the role of Bellman equation in reinforcement learning? 3

(c) What is the main concept of Markov chain? How to calculate the probability matrix (alpha) for a regular Markov chain? 5

(d) "Learn from mistakes" is related to reinforcement learning. Justify. 2

8. (a) How are the states defined in reinforcement learning? Explain. 4

(b) Compare value function and Bellman equation. 3

(c) Explain Q-learning. 4

(d) What are the steps of passive reinforcement learning? Explain. 3

## UNIT - V

9. (a) What is social learning in machine learning? 4

(b) What are the 4 stages of social learning theory? Explain each of them. 8

(c) Give a suitable real-time example of social learning. 2

10. Write short notes on: 5+5+4=14

(a) Genetic algorithms

(b) Artificial life

(c) Classifier system in GA

★★★





# UG/PG ODD SEMESTER EXAMINATION, 2022

## COMPUTER SCIENCE

9th Semester/3rd Semester

Course No. : MCS-904/MS-304

**(Machine Learning)**

Full Marks : 70

Pass Marks : 28

Time : 3 hours

*The figures in the margin indicate full marks for the questions*

(Answer any five questions, taking one from each unit)

## UNIT - I

1. (a) Choose the correct answer from the multiple choices: 1×5=5

(A) Machine Learning is a subset of ______

i. Deep Learning

ii. Soft Matters

iii. Algorithms

iv. AI

(B) The learning which involves trial and error method is:

i. Supervised learning

ii. Unsupervised learning

iii. Reinforcement learning

iv. None of the above

( Turn Over )

(C) What is the main key difference between supervised and unsupervised machine learning?
   i. Supervised learning need labelled data to train the model. Unsupervised learning does not need any labelled dataset.
   ii. Supervised learning does not need any labelled data to train the model but unsupervised learning need.
   iii. Both the learning need labelled data to train the model.
   iv. None of the above

(D) There are many machine learning algorithms till now. If given a data set, how can one determine which algorithm to be used for machine learning process. Which statement(s) below is/are correct in this context?

Statement I. If data is linear then, we use linear regression.

Statement II. If data shows non-linearity then, the bagging algorithm would do better.

Statement III.If the data is to be analyzed for some business purposes then we can use decision trees or SVM.

Statement IV. If the dataset consists of images, videos or audios then, neural networks would be helpful to get the solution accurately.
   i. Statements I,II & III
   ii. Statements I & II
   iii. Statements I & IV
   iv. All the statements are correct.

(E) In correlation of data, if 1 denotes a positive relationship, -1 denotes a negative relationship, and 0 will denote
   i. Two variables are independent of each other.



| Example no. | Place type | Weather | Location | Decision |
|---|---|---|---|---|
| I ) | hilly | winter | Kullu | Yes |
| II ) | mountain | windy | Mumbai | No |
| III ) | mountain | windy | Shimla | Yes |
| IV ) | beach | windy | Mumbai | No |
| V ) | beach | warm | Goa | Yes |
| VI ) | beach | windy | Goa | No |
| VII ) | beach | warm | Shimla | Yes |

(d) Write the properties of Principal Component Analysis (PCA) algorithm. 4

UNIT - III

5. (a) Compare reducible error and irreducible error. 3

(b) Write down the main concept behind SVM. 3

(c) Write the formula for logical regression. 2

(d) What are the four types of data that machine learning can use? 2

(e) A medical company touts its new test for a certain genetic disorder. The false negative rate is small: if you have the disorder, the probability that the test returns a positive result is 0.999. The false positive rate is also small: if you do not have the disorder, the probability that the test returns a positive result is only 0.005. Assume that 2% of the population has the disorder. If a person chosen uniformly from the population is tested and the result comes back positive, what is the probability that the person has the disorder? 4

6. (a) What do you mean by Naive Bayes classifier in machine learning? What are the three different Naive Bayes classifiers? 5

ii. Two variables are dependent of each other.
iii. Two variables have no relationship.
iv. None of the above

(b) What is computational learning theory? Explain with diagram. 3

(c) Define pruning and splitting. 2

(d) Write candidate elimination algorithm. 4

2. (a) Choose the correct answer from the multiple choices: 1×5=5

(A) Time series is a sequence of numerical data points in ________.
i. Successive order
ii. Random order
iii. Transformative order
iv. Sorted order

(B) K-Means algorithm is a ______ clustering approach.
i. Non-hierarchical
ii. Hierarchical
iii. Deterministic
iv. None of the above

(C) The first step of Canny edge detection algorithm is:
i. Convert the image to B&W scale
ii. Convert the image to grayscale
iii. Convert the image to 0's and 1's
iv. None of the above

(D) Which one is true?
i. An ordinal variable is similar to a categorical variable.
ii. A nominal variable is similar to a categorical variable.

*( Turn Over )*



iii. A categorical variable is similar to nominal variable.
iv. None of the above

(E) The problem of finding hidden structure in unlabelled data is called as
i. Unsupervised learning
ii. Reinforcement learning
iii. Supervised learning
iv. None

(b) What are three aspects which must be formalized in computational learning theory? 3

(c) Write the advantages of decision tree over logistic regression. 2

(d) Write any four issues of ML. 4

## UNIT - II

3. (a) Draw the learning cycle of EBL and explain it. 4

(b) Prove with an example: 4

Background $\wedge$ Descriptions $\wedge$ Classification = Hypothesis

(c) Write the key components of minimal consistent determination algorithm. 3

(d) What is inductive learning? Explain. 3

4. (a) How does RBL work? 3

(b) Write two points for K-means clustering. 2

(c) Suppose an example set having seven sets of attributes as following, explain how to generate a set of rules using inductive learning algorithm (ILA) for decision "yes". 5