

Reg. No. :

**Question Paper Code : 10507**

M.E./M.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

First Semester

Biometrics and Cyber Security

CP 5191 — MACHINE LEARNING TECHNIQUES

(Regulation 2017)

(Common to M.E. Computer Science and Engineering/M.E. Computer Science and Engineering/M.E. Computer Science and Engineering (With Specialization in Networks)/ M.E. Mobile and Pervasive Computing/ M.E. Software Engineering/M.Tech. Information Technology)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Distinguish : concept learning as a task and concept learning as a search.
2. How are bias and variance addressed in linear regression?
3. What is a learning rate in a perceptron network? State its purpose.
4. Define hyperplane in a support vector machine.
5. Mention the application each that is best solved using
  - (a) K-nearest neighbor (KNN) algorithm and
  - (b) Self Organizing features Map (SOM)
6. State the gaussian mixture model and how does this function in EM algorithm.
7. How does principal component analysis support dimensionality reduction?
8. What are the different types of cross over available in genetic algorithm?
9. Name an undirected graphical model and give its principle.
10. Given an example for sampling and its use.

PART B — (5 × 13 = 65 marks)

11. (a) (i) What components connect in the design of a learning system? (6)  
(ii) Explain linear discriminant and its applicability in any domain system. (7)

Or

- (b) State and explain the vector space and the candidate elimination algorithm.
12. (a) List out the parameters involved in back propagation network and state the steps involved in deriving BPN. Explain an application which works best with BPN.

Or

- (b) (i) Distinguish single layer perceptron from multilayer perceptron. (4)  
(ii) Discuss the problems in high dimensionality. How does support vector machine (SVM) help to reduce the high dimension in data? Explain in details. (9)
13. (a) Explain the different ensemble learning methods. Also, state the ways by which classifiers are combined. List the merits and demerits of combining classifiers.

Or

- (b) Write the concept of unsupervised learning and describe in detail the Self Organizing feature map with a neat sketch.
14. (a) (i) Compare the features and use of Linear Discriminant Analysis (LDA) and Independent Component Analysis (ICA). (6)  
(ii) Discuss the issues in Markov decision process. (7)

Or

- (b) List out the different evolutionary learning models. Discuss the genetic algorithm with all genetic operators. (5+8)
15. (a) State the principle of Hidden Markov Model (HMM) and explain the different types of HMM model with neat sketch. How does this HMM associated with Belief propagate?

Or

- (b) Explain the graphical models with their benefits and limitation. Give a detailed report on Bayesian network model and its use in specified applications.

PART C — (1 × 15 = 15 marks)

16. (a) Cluster the following eight points into three clusters using K-means algorithm. Assume the initial seed points of the clusters to be A1, A4 and A7 respectively. A1(2,10), A2(2,5), A3(8,4), A4(5,8) A5(7,5), A6(8,4), A7(1,2), A8(4,9).
- Trace the K-means algorithm for 3 iterations. At the end of the each iteration, show the new clusters and the centers of the new clusters.
  - Discuss the strength and weakness of k-means algorithm and how to overcome those limitations.

Or

- (b) Explain travelling sales person problem. Describe a suitable machine learning model that supports solve the problem to cover maximum number of places with minimum distance covered by the person.