

No. of Printed Pages : 4

Sl. No.

CE1.2-R4 : MACHINE LEARNING

DURATION : 03 Hours

MAXIMUM MARKS : 100

Roll No. :

--	--	--	--	--	--

Answer Sheet No. :

--	--	--	--	--	--

Name of Candidate : _____ ; **Signature of Candidate :** _____

INSTRUCTIONS FOR CANDIDATES :

- Carefully read the instructions given on Question Paper, Answer Sheet.
- Question Paper is in English language. Candidate has to answer in English Language only.
- Question paper contains Seven questions. The Question No. 1 is compulsory. Attempt any FOUR Questions from Question No. 2 to 7.
- Parts of the same question should be answered together and in the same sequence.
- Questions are to be answered in the ANSWER SHEET only, supplied with the Question Paper.
- Candidate cannot leave the examination hall/ room without signing on the attendance sheet and handing over his/her Answer Sheet to the Invigilator. Failing in doing so, will amount to disqualification of Candidate in this Module/Paper.
- After receiving the instruction to open the booklet and before answering the questions, the candidate should ensure that the Question Booklet is complete in all respects.

DO NOT OPEN THE QUESTION BOOKLET UNTIL YOU ARE TOLD TO DO SO.

1.
 - (a) Define a learning system. Explain its goals and applications.
 - (b) Describe the general-to-specific ordering of hypotheses in concept learning.
 - (c) What is the main advantage of using ensembles over single models ?
 - (d) How are decision trees translated into propositional rules ?
 - (e) Explain the concept of kernels in Support Vector Machines.
 - (f) Differentiate between generative and discriminative training in Bayesian learning.
 - (g) Why can a linear hyperplane in the transformed space correspond to a nonlinear decision boundary in the original space ? (7x4)
2.
 - (a) Define machine learning and its goals.
 - (b) Explain the concept of inductive bias in machine learning.
 - (c) Discuss the role of training data in developing a machine learning system. (6+6+6)
3.
 - (a) Describe the concept learning task and search through a hypothesis space.
 - (b) Explain the candidate elimination algorithm for finding maximally specific hypotheses.
 - (c) Discuss the importance of version spaces in concept learning. (6+6+6)
4.
 - (a) Describe the biological inspiration behind artificial neural networks. How do neurons and perceptron work ?
 - (b) Explain the backpropagation algorithm in detail. How does it help train multilayer networks ?
 - (c) What is overfitting in neural networks ? Discuss strategies such as dropout and regularization to prevent it. (4+7+7)
5.
 - (a) Define the concept of maximum margin separators in SVMs. Why is the margin important ?
 - (b) How do kernels enable SVMs to solve nonlinear classification problems ? Explain with an example.
 - (c) Discuss the role of quadratic programming in finding the optimal hyperplane for SVMs. (5+8+5)
6.
 - (a) What is Bayes' rule ? Explain its application in the Naive Bayes algorithm with an example.
 - (b) Compare and contrast generative and discriminative training methods in Bayesian learning.
 - (c) Describe Bayesian networks and Markov networks. How are they used to represent dependencies in data ? (4+6+8)
7.
 - (a) Describe the methods for measuring the accuracy of learned hypotheses.
 - (b) Explain the cross-validation technique for comparing learning algorithms.
 - (c) Discuss the use of learning curves and statistical hypothesis testing in algorithm evaluation. (6+6+6)

- o 0 o -

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK