



B.TECH DEGREE EXAMINATIONS: NOV/DEC 2023

(Regulation 2018)

Seventh Semester

INFORMATION TECHNOLOGY

U18ITI7203: Machine Learning

COURSE OUTCOMES

CO1: Differentiate between supervised, unsupervised, semi-supervised machine learning approaches.

CO2: Discuss the decision tree algorithm and identify and overcome the problem of overfitting.

CO3: Discuss and apply the back-propagation algorithm and genetic algorithms to various problems.

CO4: Apply the Bayesian concepts to machine learning.

CO5: Analyse and suggest appropriate machine learning approaches for various types of problems.

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

- | | | |
|---|-----|-------------------|
| 1. Pick up the task T, performance measure P, training experience E for a robot driving learning problem. | CO1 | [K ₃] |
| 2. Distinguish between supervised and unsupervised learning methods. | CO1 | [K ₂] |
| 3. What do you mean by gradient descent? | CO3 | [K ₂] |
| 4. Write the short note on Lamarckian evolution. | CO3 | [K ₂] |
| 5. Outline the general steps involved in EM algorithm. | CO4 | [K ₂] |
| 6. Write a short note on Gibbs algorithm. | CO4 | [K ₂] |
| 7. List out the merits and demerits of k-NN. | CO5 | [K ₂] |
| 8. Compare lazy and eager learning. | CO5 | [K ₂] |
| 9. Why is pruning important in decision tree? | CO2 | [K ₂] |
| 10. Differentiate decision tree learning and neural network based learning. | CO2 | [K ₂] |

Answer any FIVE Questions:-

PART B (5 x 16 = 80 Marks)

(Answer not more than 400 words)

- | | | | |
|---|---|-----|-------------------|
| 11. a) Explain different perspective and issues in machine learning. | 8 | CO1 | [K ₂] |
| b) For the data given below, apply the Candidate Elimination algorithm to obtain the final version space. | 8 | CO1 | [K ₃] |

Size	Colour	Shape	Class
Big	Red	Circle	No
Small	Red	Triangle	No
Small	Red	Circle	Yes
Big	Blue	Circle	No
Small	Blue	Circle	Yes

12. Use the values $w_1=1.2$, $w_2=0.6$, threshold=1 and learning rate $\eta=0.5$ to demonstrate the working of perceptron training rule for AND gate. 16 CO3 [K₃]

13. Discuss about Bayes theorem and illustrate maximum likelihood method for predicting probabilities in Bayesian learning for the following dataset. The given dataset is about stolen vehicles. Using Naïve Bayes classifier, classify the new data (Red, SUV, Domestic). 16 CO4 [K₃]

Color	Type	Origin	Stolen
Red	Sports	Domestic	Yes
Red	Sports	Domestic	No
Red	Sports	Domestic	Yes
Yellow	Sports	Domestic	No
Yellow	Sports	Imported	Yes
Yellow	SUV	Imported	No
Yellow	SUV	Imported	Yes
Yellow	SUV	Domestic	No
Red	SUV	Imported	No
Red	Sports	Imported	Yes

14. a) Write the K-nearest neighbor algorithm and by using k-NN algorithm, classify the T Shirt size of the new instance (161,61) based on the following dataset. Consider the k value as 5. 10 CO5 [K₃]

Height (cm)	Weight (kg)	T Shirt size
158	58	M
160	64	L
160	59	M
160	60	M
163	60	M
163	61	M
163	64	L
165	61	L
161	61	?

b) Explain the mistake bound model for the Halving algorithm. 6 CO4 [K₂]

15. a) Write about the algorithm of First Order Inductive Learner (FOIL) and also explain the working of the algorithm. 8 CO5 [K₂]

b) Outline the evolutionary cycle of genetic algorithm. 8 CO3 [K₂]

16. Describe the decision tree algorithm with relevant example and also mention its merits and demerits. 16 CO2 [K₂]
