



MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF COMPUTING AND INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE

UNIVERSITY ORDINARY EXAMINATION

2018/2019 ACADEMIC YEAR

**FOURTH YEAR SECOND SEMESTER EXAMINATION FOR BACHELOR
OF SCIENCE IN SOFTWARE ENGINEERING AND BACHELOR OF
SCIENCE IN INFORMATION TECHNOLOGY**

SCS 414– MACHINE LEARNING

DURATION: 2 HOURS

DATE: 17/4/2019

TIME: 2-4 P.M.

Instructions to candidates:

1. Answer question One and Any Other Two questions.
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION ONE (30 MARKS)

- a) Differentiate machine learning from traditional programming. (4 marks)
- b) Differentiate between supervised and unsupervised machine learning. (4 marks)
- c) Explain how Find-S algorithm used in concept learning works. (5 marks)
- d) Explain the basic idea behind the decision tree algorithms. (5 marks)
- e) Suppose a certain bank wants to deploy a new system for assessing credit worthiness of its customers. The new system uses a feed forward network with a supervised learning algorithm. Suggest what the bank should have before the system is used. Discuss problems associated with this requirement. (8 marks)
- f) What is Bayes Theorem? How is it used in machine learning context? (4 marks)

SECTION B – ANSWER ANY TWO QUESTIONS IN THIS SECTION

QUESTION TWO (20 MARKS)

- a) Given below are instances for the concept “days which Ted enjoys sports”

Sky	Temp	Humid	Wind	Water	Forecast	C(x)
Sunny	Warm	Normal	Strong	Warm	Same	1
Sunny	Warm	High	Strong	Warm	Same	1
Rainy	Cold	High	Strong	Warm	Change	0
Sunny	Warm	High	Strong	Warm	Change	

Using Find-S algorithm, explain how to derive the most specific hypothesis.

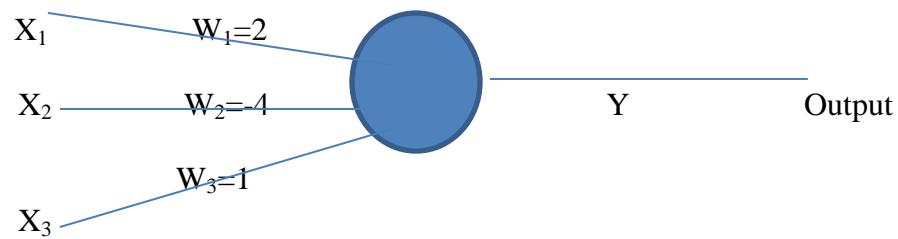
- (10 marks)
- b) What are the disadvantages of neural-networks? (4 marks)
- c) Explain any three methods of reducing dimensionality. (6 marks)

QUESTION THREE (20 MARKS)

- a) Explain pruning and its importance in decision trees. (4 marks)
- b) How does deep learning work? (6 marks)
- c) Explain the various distance measures used in calculating the closest k-neighbours. (10 marks)

QUESTION FOUR (20 MARKS)

- a) Differentiate KNN and K-means clustering. (4 marks)
- b) Explain a situation when k-nearest neighbor might fail. (4 marks)
- c) Consider the neuron shown below with three weights corresponding to three inputs.



The activation of the unit is given by the step function:

$$\varphi(v) = \begin{cases} 1 & \text{if } v \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

Calculate what will be the output value y of the unit for each of the following input patterns.

(12 marks)

Pattern	P1	P2	P3	P4
X1	1	0	1	1
X2	0	1	0	1
X3	0	1	1	1