



UNIVERSITY OF EMBU

2017/2018 ACADEMIC YEAR

SECOND SEMESTER EXAMINATIONS

**THIRD YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE,
BACHELOR OF SCIENCE (COMPUTER SCIENCE)**

CSC 323: MACHINE LEARNING

DATE: APRIL 3, 2018

TIME: 11:00 AM – 1:00 PM

INSTRUCTIONS:

Answer Question ONE and ANY other two Questions

QUESTION ONE (30 MARKS)

- a) Describe ANY TWO learning methods used in Artificial Neural Networks. (2 marks)
- b) Explain the representational power of Perceptron. (4 marks)
- c) Describe ANY FOUR learning methodologies. (4 marks)
- d) Briefly describe FOUR main areas where machine learning has been successfully been applied. (4 marks)
- e) Draw a decision tree to represent the following Boolean function: $A \wedge [B \vee C]$. (4 marks)
- f) Briefly explain the concept of k-Nearest Neighbour learning. (4 marks)
- g) Give reasons why Instance-based learning is different from all other approaches. (4 marks)

h) Consider the following set of training data.

Instance	Classification	a_1	a_2
1	+	T	T
2	+	T	T
3	-	T	F
4	+	F	F
5	-	F	T
6	-	F	T

Compute the information gain of a_2 relative to these training examples. (4 marks)

QUESTION TWO (20 MARKS)

- a) Explain how Radial Basis Method is a blend of ANN and instanced based learning method. (10 marks)
- b) Describe the BACKPROPAGATION algorithm for neural networks. (10 marks)

QUESTION THREE (20 MARKS)

- a) Explain in details the Case-based reasoning. (8 marks)
- b) Given the following learning task (malignant tumour).

ATTRIBUTES	VALUES	
Shape	Circular	Oval
Size	Large	Small
Colour	Light	Dark
Surface	Smooth	Irregular
thickness	Thin	Thick

- i) Describe it informally in a paragraph (3 marks)
- ii) Describe it by stating as precisely as possible the following:
 - I) The learning task, (2 marks)
 - II) The performance measure (2 marks)

- III) The training experience. (2 marks)
- IV) Propose a target function to be learned and its target representation (3 marks)

QUESTION FOUR (20 MARKS)

- a) Based on your own understanding on machine learning, briefly describe by giving suitable examples the differences between **training samples** and **testing samples**. (6 marks)
- b) Assume that you have been provided with a database of customers from a departmental store to be analysed.
- i) Perform a basket analysis to find the dependencies between two items X and Y . (6 marks)
- ii) Generalize (i) above to include more than two items. (8 marks)

QUESTION FIVE (20 MARKS)

- a) List the steps of Rule-pruning method in finding high accuracy hypothesis.(7 marks)
- b) Assume you are given the task of building an automated taxi. Describe the following;
- i) The constraints to be used. (4 marks)
- ii) The inputs required. (4 marks)
- iii) The output. (2 marks)
- iv) The “language” to communicate with other automated taxis. (3 marks)

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