



TECHNICAL UNIVERISTY OF MOMBASA

Faculty of Engineering & Technology

UNIVERSITY EXAMINATION FOR:
BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY
(BSIT 12J – Y3 S1 BTIT 11M – Y4 S1)

EIT 4406/BIT 2319: ARTIFICIAL INTELLIGENCE

END OF SEMESTER EXAMINATION

SERIES: APRIL 2014

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

This paper consists of **FIVE** questions.

Attempt question **ONE (COMPULSORY)** and any other **TWO** questions

Maximum marks for each part of a question are as shown

This paper consists of **THREE** printed pages

Question One (Compulsory)

- a) Briefly explain the following A.1 concepts. **(6 marks)**
- (i) Agent
 - (ii) Rational agent
 - (iii) Autonomous agent
- b) What is the difference between a goal oriented and a utility-based agent? When explaining the difference, describe what a utility function is. **(5 marks)**
- c) Provide an example of an agent environment that is:
- (i) Static
 - (ii) Discrete
 - (iii) Full observable
 - (iv) Episodic **(8 marks)**

- d) Show in pseudo code, a simple genetic algorithm with brief description of each of the main elements. **(6 marks)**
- e) Use an outline diagram to describe the structure of the main parts of an expert system. **(5 marks)**

Question Two

- a) Show how Breath-First-Search and Depth-First-Search can be implemented using some appropriate pseudo-code **(8 marks)**
- b) For the search tree below, show at each step what nodes are in the queue for both the Breath-First-Search and Depth-First-Search. Show the list of nodes that are expanded. **(7 marks)**

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- c) What is the worst case time and space complexity of the above two algorithms. **(2 marks)**
- d) Describe the terms complete and optimal with regards to evaluating search strategies. Are either Breath-First-Search or Depth-First-Search complete? Is either of them optimal, discuss **(3 marks)**

Question Three

- a) Briefly describe the Turing Test. **(4 marks)**
- b) If the Turing Test is passed does this show that computers exhibit intelligence? State your reasons. **(6 marks)**
- c) Given the following 8-puzzle, define the problem as a search problem in terms of states, operators, a goal test and a path cost. **(6 marks)**

Goal State

- d) State any TWO technique used in machine learning? **(2 marks)**
- e) What is meant by “First Order Predicate Calculus” or “First Order Logic” **(2 marks)**

Question Four

- a) Translate into predicate logic: **(4 marks)**
- (i) All birds that are not penguins fly”
 - (ii) Every child has exactly two parents”
- b) Construct a semantic network to represent the following information. Falcons and eagles are birds. All birds have wings, feathers and a beak. In particular eagles have light feathers and long beaks. Birds fly and use aerodynamic principles. Gliding is a principle used by eagles. Plane also fly, have wings and use aerodynamic principles. A plane has an engine and a pilot. An engine uses petrol A Boeing 747 is a plane. **(6 marks)**
- c) Alice, Bob, Camilla and Dan are making plans for spring break. They go to the travel agency, but there are only 2 tickets left. Alice will only go if Bob goes too. Dan will only go if Camilla goes too. Bob has found out that he has to work on the AI project, so he cannot go.
- (i) Using 4 literals, write the propositional logic formulas corresponding to this text. **(5 marks)**
 - (ii) Alice will go only if Bob goes **(2 marks)**
 - (iii) Dan goes only if Camilla goes **(2 marks)**
 - (iv) Bob cannot go **(1 mark)**

Question Five

- a) Human intelligence can be defined as “a person’s ability to solve problems, utilize logic and think critically.” Discuss how this definition compares and differs with the definition of Artificial Intelligence. **(4 marks)**
- b) Explain the importance of Artificial Intelligence in Industry and the Military using one example or reason in each case. **(6 marks)**
- c) Discuss machine vision and natural language and understanding considering in each case the main object or activities, challenges and potential applications. **(6 marks)**
- d) Define the term knowledge representation and show how rules qualify to be a knowledge representation formation. Discuss ONE advantage for using rules as a representation formalism. **(6 marks)**