



MACHAKOS UNIVERSITY

University Examinations for 2022/2023

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

SECOND YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE IN COMPUTER SCIENCE

SCO205: FOUNDATIONS OF ARTIFICIAL INTELLIGENCE

DATE:

TIME:

Instructions

Attempt Question One and Any Other Two questions in this paper

QUESTION ONE (30 MARKS) [COMPULSORY]

- a)
 - i) Define artificial intelligence (A.I.) (2 marks)
 - ii) Lists four benefits of an AI system. (2 marks)
 - iii) Identify any current AI software tool such as ChatGPT and explain its features that qualify it to be an AI software. (4 marks)
- b)
 - i) State what you understand by the terms cognitive science. (2 marks)
 - ii) Differentiate the following AI concepts:
 - 1. Rule vs fact
 - 2. Proportional vs predicate logic
 - 3. Thinking humanly vs thinking rationally(6 marks)
- c)
 - i) Briefly explain your understanding of an rational agent. (2 marks)
 - ii) With regard to rational agents, explain the meaning of the following functional notation: $[f: P^* \rightarrow A]$. (3 marks)

QUESTION TWO (20 MARKS)

- a)
 - i) Define the terms Expert System (ES). (2 marks)
 - ii) Explain briefly the motive behind the development of ESs. (4 marks)
 - iii) Outline the stages followed while transferring expertise from an expert to a computer system, then to a user. (4 marks)

- iv) State four differences between an ES and other conventional systems. (4 marks)
- b) i) Using a suitable diagram describe the main components of an ES. (5 marks)
- ii) Name any two examples of ES that you know of. (2 marks)

QUESTION THREE (20 MARKS)

- a) i) State what you understand by the Turing Test. (2 marks)
- ii) Discuss an example of how the Turing Test has been carried out. (5 marks)
- b) i) Briefly explain what is meant by inferencing as used in AI. (4 marks)
- ii) Outline five elements that can be used to demonstrate intelligent behaviour of a system. (5 marks)
- iii) Provide three advantages and three disadvantages of AI compared to natural intelligence. (6 marks)

QUESTION FOUR (20 MARKS)

- (a) PROLOG is one of the programming languages used in artificial intelligence. Name any other two examples of such programs. (2 marks)
- (b) (i) Describe the meaning of each of the following prolog programming clauses
`mother_child(trude, sally).`
`father_child(tom, sally).`
`father_child(tom, erica).`
`father_child(mike, tom).`
`sibling(X, Y) :- parent_child(Z, X), parent_child(Z, Y).`
`parent_child(X, Y) :- father_child(X, Y).`
`parent_child(X, Y) :- mother_child(X, Y).`
(10 marks)
- (ii) Write appropriate prolog statements to find out:
 - 1. whether sally and erica are siblings. (4 marks)
 - 2. who the father of sally is. (4 marks)

QUESTION FIVE (20 MARKS)

Consider the following case scenario:

Steffany is a student of MKSU who wants to get a degree in Computer Science. Her university catalog tells her that she needs to take 30 IT units, including six mathematics units, Calculus 1 and Calculus 2. The first of these is a prerequisite for the other, and the second is a prerequisite for Research Projects, which is also required for the degree.

- (a) Develop appropriate logic statements to illustrate the above case scenario. (10 marks)
- (b) Create a suitable truth table to represent the logic statements developed in (a) above. (10 marks)