



# MANICALAND STATE UNIVERSITY OF APPLIED SCIENCES

FACULTY OF ENGINEERING, APPLIED SCIENCES AND  
TECHNOLOGY

DEPARTMENT: COMPUTER SCIENCE AND INFORMATION SYSTEMS

MODULE: ARTIFICIAL INTELLIGENCE

CODE: BCOS422

SESSIONAL EXAMINATIONS

DECEMBER 2023

DURATION: 3 HOURS

EXAMINER: Dr C. KURANGA

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## ***INSTRUCTIONS***

1. Answer ***any four*** questions
2. Each question carries 25 marks
3. Start a new question on a fresh page

***Additional material(s): None***

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### Question 1

- a) Explain:
  - i. The term, 'artificial intelligence'; and [4]
  - ii. The role of the intelligent systems and their potential benefits. [8]
- b) Describe five components of an Artificial Intelligence system. [5]
- c) Outline the major difficulties in developing intelligent systems. [8]

### Question 2

- a) Describe knowledge representation. [8]
- b) Discuss **five** Artificial Intelligence agent types. [10]
- c) Examine domain tasks of Artificial Intelligence. [7]

### Question 3

- a) Describe a search space definition. [5]
- b) Write an uninformed search algorithm. [6]
- c) Explore hill-climbing technique challenges. [8]
- d) Explain three main branches of machine learning. [6]

### Question 4

- a) Compare and contrast depth first search and breadth first search. Mention their time and space complexities. [10]
- b) Explain how heuristically informed procedure improves the search process. [8]
- c) Discuss feed-forward Artificial Neural Networks. [7]

### Question 5

- a) Write the following using first order predicate logic:

- i. For everyone there is someone to love; [3]
- ii. Every cellphone is owned by somebody; and [3]
- iii. Tino owns a car. [3]
- b) Interpret the following first order predicate logic:
- i.  $\exists x. Owns(Rudo, x) \rightarrow Cat(x)$ ; [3]
- ii.  $\forall x \exists y \text{ married}(x, y) \text{ and } \forall z (\text{married}(x, z) \rightarrow y = z)$  [3]

c) Draw the semantic net for the following given statement:

Motorbike is a two-wheeler and it is a moving vehicle. Vehicle needs an engine, a fuel system to sustain the engine running, an electric System for its lights, horn and breaks. [10]

### Question 6

- a) Discuss a evolutionary algorithm. [10]
- b) Explain adaptive learning. [7]
- c) Explore features of a production system. [8]

**END OF EXAMINATION**