

UGANDA MARTYRS UNIVERSITY  
NKOZI CAMPUS  
  
FACULTY OF SCIENCE  
DEPARTMENT COMPUTER SCIENCE AND INFORMATION SYSTEMS  
ARTIFICIAL INTELLIGENCE  
FINAL ASSESSMENT  
ACADEMIC YEAR 2023/2024 SEMESTER 1  
BACHELOR OF SCIENCE IN COMPUTER SCIENCE YEAR 3

**Date of Examination: Tuesday 12<sup>th</sup> December 2023**

**Time allowed: 3 hours (09:30am – 12:30pm)**

**Instructions to Candidates:**

**Read the following before answering the examination questions.**

- 1) Do not write anything on this question paper.
- 2) Show all the necessary workings
- 3) This exam consists of two sections. Section A is theoretical and should be answered on answer sheets on the day of the exam for 90 minutes. Section B is a practical project and should be implemented throughout the week following the exam, and presented.
- 4) Answer all questions in Section A and only one (1) question from section B.
- 5) Be as concise as possible and write neatly. All rough work must be done in the Answer Book and crossed through
- 6) Each Question should be attempted of a new page.

**SECTION A: (20 Marks)**

**SECTION A (40 Marks)**

- i. Attempt ALL the questions in this section
- ii. Answers to this section MUST be handed in before proceeding to the next section

**Question one**

- a) What is Artificial Intelligence? (2 Marks)
- b) With examples, explain the three disciplines that make up Artificial Intelligence. (6 Marks)
- c) Give six real world applications of AI. (6 marks)

**Question two**

- a) What is a rational agent as used in Artificial Intelligence? (2 Marks)
- b) Explain the difference between bounded rationality and unbounded rationality among agents as used in Artificial Intelligence. (4 Marks)
- c) With examples, explain the difference between Learning agents and Utility-based agents. (4 Marks)

**Question Three**

- a) Explain the difference between informed search strategies and uninformed search strategies (2 Marks)
- b) With examples, discuss any three dimensions along which search strategies in Artificial intelligence are evaluated. (6 Marks)
- c) State any two informed search strategies and any two uninformed search strategies. (2 Marks)

**Question Four**

- a) With relevant examples, explain the following concepts as they are applied to Artificial Intelligence. (2 Marks @)
  - i. Supervised Learning
  - ii. Unsupervised Learning
  - iii. Deep Learning
  - iv. Reinforcement Learning
- b) Briefly discuss two ethical issues that may arise due the high proliferation of artificial Intelligence (2 Marks)



## SECTION B (60 Marks)

- i. This section is practical and should be implemented for one week (Starting on the day of the exam). Presentation of the results SHALL be one week after the day of the exam.
- ii. Attempt any one questions from this section.

### Question One: (Project: House Price Predictor)

House prices predictor is a system that learns about data in a given and predicts future prices of the homes in the city.

Goals:

Use Python to do the following:

1. Run a regression that predicts the prices of homes in a given city.
2. Interpret your result, and tell whether you think that you have found a useful forecasting equation.

These goals may be accomplished by:

1. Building a Python application and applying available algorithms in the application,
2. ~~Developing a new learning algorithm(s)~~ or a novel variant of an existing algorithm,
3. Or both.

### Question Two: (Project: Traffic Jam Predictor)

Have you ever been stuck in a sudden traffic jam for over an hour? If you knew that there would be heavy traffic, you would've taken an alternate route to save time.

You are required to build a traffic jam prediction model using any techniques in artificial Intelligence and machine learning of your choice using Python. You can use openly available datasets of your choice for this purpose. You can get data of various traffic event types, along with their date, time, and exact location. You can then use the data to build a model that predicts the location and time of the next traffic jam.

### Question Three (Project: Game)

Design and develop a multiplayer (at least two player) game of your choice following and applying all the principles of game theory.