UGANDA MARTYRS UNIVERSITY
NKOZI

UNIVERSITY EXAMINATIONS

FACULTY OF SCIENCE

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION SYSTEMS

SEMESTER I 2021-2022
THIRD YEAR EXAMINATION FOR BSC. COMPUTER SCIENCE
ARTIFICIAL INTELLIGENCE
CSC 2107

DATE: 20th January 2022

TIME: **9:30 AM – 12:30 PM**

DURATION: 3HRS

Instructions:

1. *Carefully read through ALL the questions before attempting*
2. *This paper consists of two sections, A and Section B*
3. *Answer **ALL** Questions in Section A*
4. *Answer any **TWO** Questions in Section B*
6. *Write your answers in the answer booklet provided*
7. *No **names** should be written anywhere on the examination book.*
8. *Ensure that your **Reg number** is indicated on all pages of the examination answer booklet.*
9. *Ensure your work is **clear** and **readable**. Untidy work shall be penalized*
10. *Any type of examination Malpractice will lead to automatic disqualification*
11. *Do not write anything on the question paper.*

SECTION A (60 MARKS)

QUESTION 1: Explain any five characteristics of intelligent behavior. **[5 MARKS]**

QUESTION 2: The goal of Artificial Intelligence (AI) is to create systems or machines that, "think like humans", "act like humans", "think rationally", and "act rationally". Explain what you understand by each of these concepts. **[8 MARKS]**

QUESTION 3: An agent is described as anything capable of perceiving its environment through *sensors* and acting upon that environment through *actuators*. What characteristics make a human and a robot fit the description of an agent? **[4 MARKS]**

QUESTION 4: Explain the following in respect of an intelligent agent: Percept, Action, Goal, Environment. **[8 MARKS]**

QUESTION 5: Distinguish between the following properties of task environments. **[10 MARKS]**

i. Fully observable **vs.** Partially observable environment
ii. Multi-agent **vs.** Single-agent environment
iii. Discrete **vs.** Continuous environment
iv. Deterministic **vs.** Stochastic environment
v. Static **vs.** Dynamic environment

QUESTION 6: Explain the following types of agents **[9 MARKS]**

i. Simple reflex agent
ii. Goal-based agent
iii. Learning agent

QUESTION 7: Outline the four stages of the problem-solving process for an agent. **[8 MARKS]**

QUESTION 8: Explain the following criteria for evaluating search strategies: Completeness, Time complexity, Space complexity, Cost optimality. **[8 MARKS]**

SECTION B (40 MARKS)

QUESTION 9: Using illustrations, explain the below uninformed search strategies. **[20 MARKS]**

i. Breadth-first search
ii. Uniform-cost search
iii. Depth-first search
iv. Depth-limited search
v. Iterative deepening search

QUESTION 10:

i. What is an informed search strategy? **[2 MARKS]**
ii. Explain the idea of "best first search" **[2 MARKS]**
iii. Distinguish between *greedy search* and *A* (A-star) search* **[4 MARKS]**

iv. What is a knowledge base? **[2 MARKS]**
v. Describe using a diagram the different components of a knowledge base **[4 MARKS]**
vi. Describe two different ways in which intelligent agents may be viewed from the point of knowledge representation **[4 MARKS]**
vii. What is syntax and semantics in Logic? **[2 MARKS]**

QUESTION 11:

i. What is machine learning, and why is machine learning becoming increasingly popular among software engineers? **[4 MARKS]**
ii. Explain the following types of machine learning: supervised learning, unsupervised learning, reinforcement learning. **[6 MARKS]**
iii. Explain using examples any five real-world applications of machine learning or artificial intelligence today. **[10 MARKS]**

THE END!