NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCES

DEPARTMENT OF COMPUTER SCIENCE

ARTIFICIAL INTELLIGENCE

SCS 4101

EXAMINATION PAPER 2024

This examination paper consists of 3 pages

Time Allowed: 3 hours

Total Marks: 100

Examiner's Name: Mr. W Mapenduka

External Examiner: Dr Cross Gombiro

INSTRUCTIONS

1. Answer any four (4) questions.

2. Write code snippets (part of the program code that addresses only the functionality requested in the question) in programming questions.

MARK ALLOCATION

QUESTION	MARKS
1.	25
2.	25
3.	25
4.	25
5.	25
TOTAL FOR FOUR QUESTIONS	100

QUESTION ONE

a) List the characteristic features of the following:

    i. Intelligent agent   [3]

    ii. Expert system   [4]

b) Explain how problem characteristics help in the selection of AI techniques with possible examples. [6]

c) Discuss benefits and challenges associated with use of emerging AI technologies such as Generative AI tools in education. [12]

QUESTION TWO

a) Explain the concept of rationality in intelligent agents. [5]

b) Describe any two types of environment in intelligent agents. [6]

c) Explain Reflex agents with state with aid of an example. [6]

d) Describe the general architecture of an Intelligent Agent with the support of a diagram. [8]

QUESTION THREE

a) Explain the algorithm for breadth first search algorithm. [5]

b) Give the outline of the uniform cost search algorithm. [6]

c) What are the differences and similarities between problem solving and planning? [6]

d) Differentiate depth first search from depth limited search. [8]

QUESTION FOUR

a) Discuss the process of machine learning with an example. [8]

b) We have a set of data from patients who have visited Zim Central University hospital during the year 2023. A set of features (e.g., temperature, height) have been also extracted for each patient. Our goal is to decide whether a new visiting patient has any of diabetes, heart disease, or Alzheimer (a patient can have one or more of these diseases).

    i. Explain how you can design and train a classifier which can be used to predict the type of disease the patient is suffering from. [8]

    ii. Some patient features are expensive to collect (e.g., brain scans) whereas others are not (e.g., temperature). Therefore, we have

decided to first ask our classification algorithm to predict whether a patient has a disease, and if the classifier is 80% confident that the patient has a disease, then we will do additional examinations to collect additional patient features. In this case, which classification methods do you recommend: neural networks, decision trees, or naive Bayes? Justify your answer. [9]

QUESTION FIVE

a) Write a script for the withdrawal process in a banking system. [5]

b) Discuss the significance of sensors and vision systems in robotics designing. [10]

c) Describe the Artificial Neural Network with use of an example. [10]

__END OF EXAMINATION__