



NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY FACULTY OF  
FACULTY OF SCIENCE AND TECHNOLOGY EDUCATION

DEPARTMENT OF SCIENCE, MATHEMATICS AND TECHNOLOGY EDUCATION

PST 6378 EVOLUTIONARY COMPUTING AND PARALLEL DISTRIBUTED PROCESSING

Main Examination  
November/December 2024

This Examination Paper consists of 4 pages

Time Allowed: 3 hours  
Total Marks: 100  
Internal Examiner: A. Mangena  
External Examiner: Dr B Moyo

**INSTRUCTIONS**

1. Answer any four questions.
2. Each question carries 25 marks. Total Marks are 100 .

**ADDITIONAL MATERIALS NEEDED**

1. None

**MARK ALLOCATION**

QUESTION	MARKS
1.	25
2.	25
3.	25
4.	25
5.	25
<b>TOTAL</b>	<b>100</b>

**Question One**

- i) Explain the major arguments for Evolutionary Computing. [6 marks]
- ii) Compare and contrast heuristic and metaheuristic algorithms. [6 marks]
- iii) Describe the three types of Machine Learning. [13 marks]

**Question Two**

- i) Distinguish between serial computing, parallel computing and grid computing. [15 marks]
- ii) Study Figure 2.1.

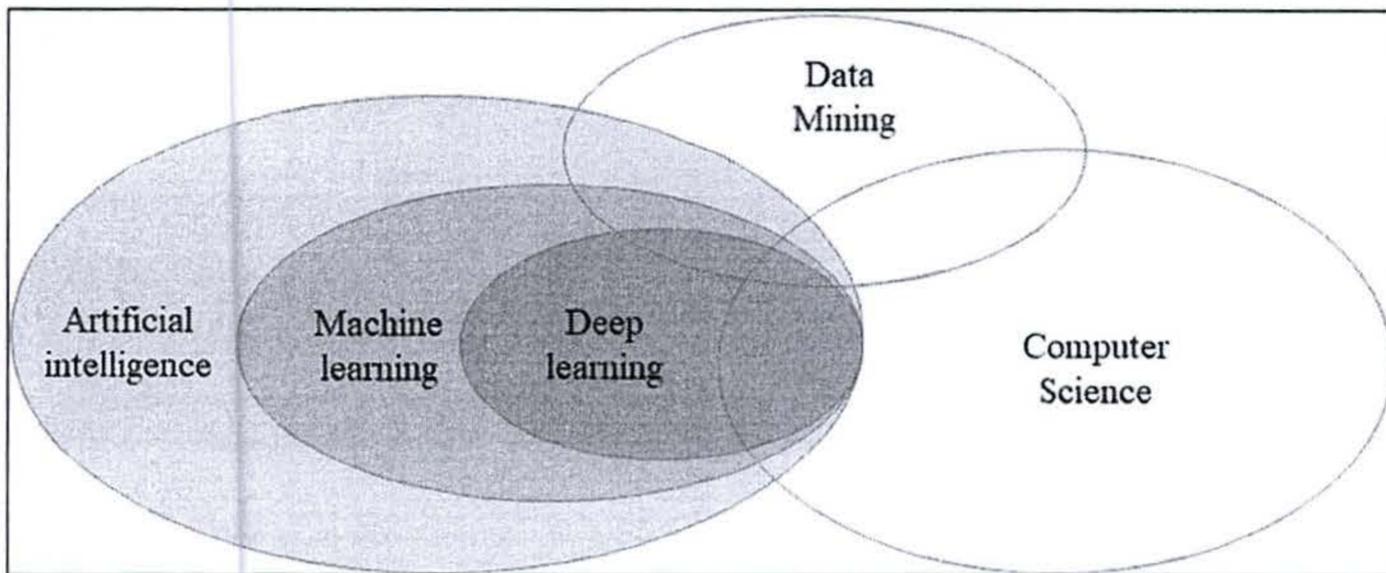


Figure 2.1

Explain the difference concepts in Figure 2.1 and the subsequent relationships formed between them.

[10 marks]

**Question Two**

a) Explain the basic principle behind the following algorithms:

i. Ant Colony Optimization algorithm

ii. BAT Algorithm

[12 Marks]

b) Describe some real-world applications of ABC Algorithms.

[13 Marks]

### Question Three

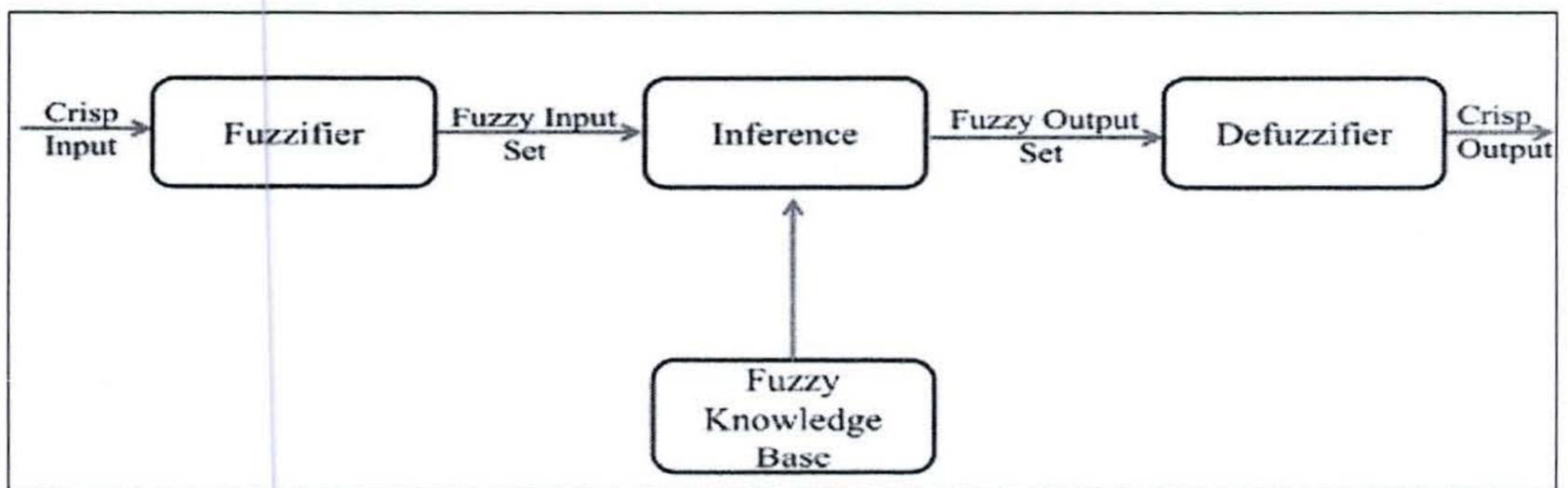


Figure 3.1

I. With reference to Figure 3.1 explain the concept of Fuzzy Logic.

[10 Marks]

II. With reference to Expert systems describe the importance of Fuzzy Logic.

[15 Marks]

### Question Four

Discuss the significance of Alan Turing's contributions to the field of computing and how they laid the foundation for modern computer science.

[25 Marks]

### Question Five

Using a well labelled diagram, short explanations and an example, explain the following concepts related to Artificial Neural Networks.

- Neurons (Nodes or Units)
- Input Layer
- Hidden Layer(s)
- Output Layer
- Weights
- Bias
- Activation Function
- Backpropagation
- Training

[25 Marks]

~End of Examination~