NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCES

DEPARTMENT OF COMPUTER SCIENCE

PARALLEL AND DISTRIBUTED PROCESSING

SIA 2202

Main Examination Paper

2025

This examination paper consists of 3 pages

Time allowed: 3 hours

Total Marks: 100

Examiner's Name: Mrs. B. Ndlovu

External Examiner: Dr LC Sakala

INSTRUCTIONS TO THE CANDIDATES

1. Answer any four (4) questions
2. Each question carries 25 marks.

MARK ALLOCATION

QUESTION	MARKS
1.	25
2.	25
3.	25
4.	25
5.	25

QUESTION ONE

(a) Explain how Amazon Web Services (AWS) can support SOAP webservices in building legacy systems with strict data structures and complex business logic. **[15]**

(b) Using a programming language of your choice, implement the Fork and Join Pool. **[10]**

QUESTION TWO

(a) State and discuss how the following laws are applied in parallel processing:

(i) Amdahl's Law

(ii) Moore's Law **[10]**

(b) Differentiate between Very Long Instruction Word (VLIW) and speculative decomposition of a parallel program? **[15]**

QUESTION THREE

(a) With the aid of a diagram, explain how Grid Computing uses a distributed architecture to connect to large numbers of computer nodes **[10]**

(b) YARN provides generic scheduling and resource management services so that you can run more than just Map Reduce. Discuss **[15]**

QUESTION FOUR

Imagine you are part of a software development team tasked with creating a new online shopping platform. The platform needs to handle a high volume of users who will browse products, add items to their cart, and process payments securely. Your system needs to be created in such a way that it is "multi-tier" in nature. With the aid of a diagram, describe how you would incorporate each of the following in your system and the role of each tier. :

(a) Business Logic Tier **[10]**

(b) Persistence Layer **[5]**

(c) Thin and Fat clients **[5]**

QUESTION FIVE

From the viewpoint of an Enterprise Architecture Programmer, parallel computers are classified by the concurrency in processing sequences, data and instructions. Using clearly labelled diagram(s), explain a taxonomy that categorises forms of parallel computer architectures. **[25]**

END QUESTION PAPER