



NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCE

DEPARTMENT OF COMPUTER SCIENCE

OBJECT ORIENTED SOFTWARE CONCEPTS AND DEVELOPMENT

SCS 2108

EXAMINATION PAPER 2024

This examination paper consists of 4 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. Use **Java** as the programming language for all program coding questions.

MARK ALLOCATION

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

QUESTION ONE

- a) Java is a platform independent language, Justify. [4]
- b) Distinguish between polymorphism and inheritance as applied in Object Oriented Programming. [4]
- c) With the aid of a diagram, distinguish between base class and derived class as applied in object oriented programming. [5]
- d) A university manages its students using a program that has a class Student with subclasses FirstYear, SecondYear, and ThirdYear for year-specific state and behaviour. The program has a List<Student> that contains all Students. Should Student be a class, an abstract class or an interface? Explain your answer. [6]
- e) Explain how dynamic binding works in Java and give an example. [6]

QUESTION TWO

- a) Explain what is required for automatic or implicit type conversion in Java. [4]
- b) Describe two different ways of passing arguments to a function. [4]
- c) Explain method overloading in Java with proper example. [7]
- d) Consider a system for administering the lending of books at a university library. A person must be a member of the university's community and must be in good standing – that is, not have any outstanding fines or overdue books, to borrow books. A book may be borrowed for up to two weeks at a time. A book loan may be renewed if the book is returned before the loan's due date and if no other library member has expressed an interest in borrowing the book. If a book is returned after the loan's due date, the borrower will be charged a fine of \$1 for each late day. Fines are paid to the library staff at the circulation desk, where books are returned. Heavily-used books may be put on reserve, meaning that members can read them only in the library and cannot borrow them.
Provide a use-case diagram that depicts only those use cases that are initiated by library members. [10]

QUESTION THREE

- a) Illustrate with an appropriate simple code fragment how an array is passed to a method as an argument in Java. [3]
- b) Write a Java program segment to declare an array called marks and assign it the values 80, 55, 76, 98 and 93 which represent the marks scored by a student. [4]
- c) Write a Java program that accepts a pair of integers and a pair of floating point numbers and then uses an overloaded method named max to return the bigger value in each case. The program should output the bigger values. [8]
- d) Write a Java program that would instantiate a class named TotalMark with the following properties:
- ┆ a data member named x;
 - ┆ a member function named input for setting the value of x to 77;
 - ┆ a member function named display for outputting the value of x. [10]

QUESTION FOUR

- a) Illustrate the syntax for declaring and initialising an array of five floating point numbers. [4]
- b) Write a Java program that catches negative exceptions (user defined exception). This is caused when a negative number is entered by the user. [5]
- c) Write a program to display the name, pages, price and author of a book using an interface mechanism. [8]
- d) Write a Java program that implements a class named Odd with a data member named x and method named read that accepts an integer from the keyboard. The program determines whether the integer is odd or even and displays an appropriate message. [8]

QUESTION FIVE

- a) What are applets? [3]
- b) Differentiate AWT with swing. [4]
- c) Explain any two types of layout management in Java. [4]
- d) Describe any two types of JDBC drivers. [6]
- e) Explain how exceptions are handled in java with a proper example. [8]

__END OF EXAMINATION__