NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF SCIENCE AND TECHNOLOGY EDUCATION

DEPARTMENT OF SCIENCE, MATHEMATICS AND TECHNOLOGY EDUCATION

PST 2175 OBJECT ORIENTED PROGRAMMING

Main Examination Paper

November/December 2024

This examination paper consists of 5 pages

Time Allowed: 3 hours 30 minutes

Total Marks: 100

Special Requirements: None

Examiner's Name: Mr A.M. Mangena

External Examiner: Dr B Moyo

INSTRUCTIONS

1. Answer all questions in Section A and 3 questions in Section B.
2. In all practical questions, unless expressed otherwise use C++ Language.
3. All code must have **comments** and **indentations.**
4. No internet allowed.
5. All projects, cpp files must be saved in desktop folder named as Student Number.

SPECIAL REQUIREMENTS

1. Computers with Code blocks, Dev++ or Visual C++ and .Net Framework Installed.
2. The invigilator will need a Flash Disk and a blank CD to collect exams.

MARK ALLOCATION

QUESTION	MARKS
1	20
2.	20
3.	20
4.	20
5.	20
6.	20
TOTAL	100

Section A Theory (Compulsory)

Question One [20 Marks]

a) Distinguish between run time (dynamic) polymorphism and compile time (static) polymorphism.

[4 Marks]

b) How does abstraction differ from encapsulation, and why is it important?

[4 Marks]

c) Explain the difference between single inheritance and multiple inheritance. Use diagrams and short notes to help explain your answer.

[4 Marks]

d) What is a class and an object? How do they relate to each other? Describe with a real-life analogy.

[4 Marks]

e) Write a C++ program that accepts 3 values and finds the average of the three numbers.

[4 Marks]

Question Two [20 Marks]

Identify and Explain the following Object Oriented Programming concepts in the following code:

a) The object/s
b) The class/s
c) The method/s
d) Inheritances
e) Polymorphism
f) Access modes
g) Encapsulation

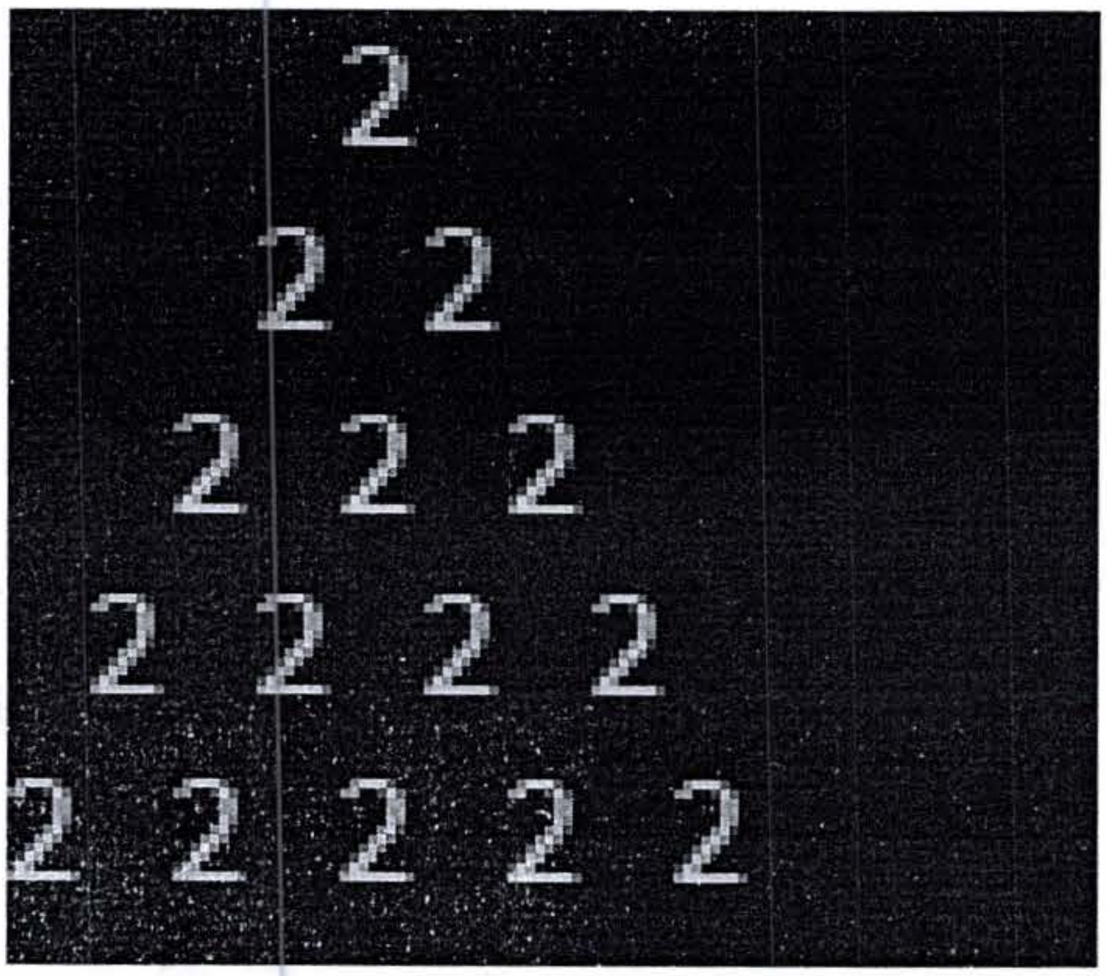
[20 Marks]

```
#include <iostream>
using namespace std;
class Animal {
protected:
    string name; // Encapsulated data member (protected)
public:

    Animal(string n) : name(n) {}
    virtual void makeSound() {
        cout << name << " makes a sound." << endl;
    }
    string getName() {
        return name;
    }
};
class Dog : public Animal {
public:
    Dog(string n) : Animal(n) {}

    void makeSound() override {
        cout << name << " barks." << endl;
    }
};
class Cat : public Animal {
public:
    Cat(string n) : Animal(n) {}

    void makeSound() override {
        cout << name << " meows." << endl;
    }
};
int main() {
    Dog myDog("Buddy");
    Cat myCat("Whiskers");

    cout << "My dog's name is: " << myDog.getName() << endl;
    cout << "My cat's name is: " << myCat.getName() << endl;
    Animal* animal1 = &myDog;
    Animal* animal2 = &myCat;
    animal1->makeSound(); // Calls Dog's makeSound()
    animal2->makeSound(); // Calls Cat's makeSound()
    return 0;
}
```

Section B Practical

Question Three

a) Write a program that shows the following output:



[10 Marks]

b) Write a program that shows the use of arrays. **[10 Marks]**

Question Four

a) Write a C++ program showing the following:

- A class called "***Printers***",
- Data members of **Datatype** Int called ***size,***
- Data members of **Datatype** String called ***color***, and ***brand,***
- ***Public*** Access Mode,
- Objects ***impact***, ***nonimpact,***
- Member function ***cost.***

[10 Marks]

b) Write a short program demonstrating how the concept of concatenation works.
[10 Marks]

Question Five

a) Write a C++ program that accepts 3 integers and determines out of the 3 numbers which number is the largest. Also make sure each line of code should have comments explaining what is the purpose of the code

[10 Marks]

b) Write a program to calculate the Simple Interest using the formula:
Simple Interest (SI)= (P×R×T)/100
Where:
P is the principal amount,
R is the rate of interest, and
T is the time (in years).
The program should take input for P, R, and T from the user and then calculate and display the Simple Interest.

Also make sure each line of code should have comments explaining what is the purpose of the code

[10 Marks]

Question Six

Show using simple C++ code the use of:

a) Creating and Printing onto of .txt files using fstream.

[10 Marks]

b) Selection statements, such that a student enters the symbol they got for an exam,
If student enters an A the output is "Distinction"
If student enters a B the output is "Merit"
If student enters a C the output is "Pass"
If student enters D the output is "Fail"
Anything other input the output is "invalid symbol."

[10 Marks]

End of Exam