The Management University of Africa

MUA

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UNDERGRADUATE UNIVERSITY EXAMINATIONS

SCHOOL OF SCIENCE AND TECHNOLOGY

DEGREE OF BACHELOR OF BUSINESS INFORMATION TECHNOLOGY

BBIT 203: OBJECT ORIENTED PROGRAMMING 1 (C++)

DATE: 10TH APRIL 2026

DURATION: 2 HOURS

MAXIMUM MARKS: 70

INSTRUCTIONS:

1. Write your registration number on the answer booklet.
2. **DO NOT** write on this question paper.
3. This paper contains **SIX (6)** questions.
4. Question **ONE** is compulsory.
5. Answer any other **THREE** questions.
6. Question **ONE** carries **25 MARKS** and the rest carry **15 MARKS** each.
7. **Write all your answers in the Examination answer booklet provided.**

QUESTION ONE

Read the Case Study below carefully and answer the questions that follow:

Case Study: Student Management System in C++

Overview

This case study presents a simplified C++ program designed using Object Oriented Programming (OOP) principles. The system manages basic student information and demonstrates the use of classes, constructors, member functions, access control, and memory handling.

Problem Statement:

A developer is required to design a Student Management System that:

- Stores student ID, name, and marks
- Calculates the average marks
- Displays student details

Below is a partial implementation submitted by a student, which compiles but does not fully follow good OOP practices:

```
#include <iostream>
using namespace std;
class Student {
public:
   int id;
   string name;
   float marks;

   void input() {
      cout << "Enter ID: ";
      cin >> id;
      cout << "Enter Name: ";
      cin >> name;
      cout << "Enter Marks: ";
      cin >> marks;
   }
   void display() {
      cout << id << " " << name << " " << marks << endl;
   }
};
int main() {
   Student s;
   s.input();
   s.display();
   return 0;
}
```

a) Identify and explain THREE weaknesses in the above program related to object oriented programming principles. **(10 Marks)**

b) Rewrite the program in the case study above to include:
   - Proper access control
   - A constructor for initialization
   - A function to calculate and return grade based on marks **(10 Marks)**

c) Explain how dynamic memory allocation could be applied if multiple students were to be handled. **(5 Marks)**

QUESTION TWO

a) Explain the concept of constructors and destructors in C++. Illustrate your answer using a simple class example. **(8 Marks)**

b) Differentiate between pass-by-value, pass-by-reference, and pass-by-pointer in C++. Provide a code example for each. **(7 Marks)**

QUESTION THREE

a) Define inheritance in C++ and explain how it supports code reusability. **(5 Marks)**

b) Write a C++ program demonstrating single inheritance using a base class Person and a derived class Employee. **(10 Marks)**

QUESTION FOUR

a) Explain polymorphism and the role of virtual functions in C++. **(7 Marks)**

b) Using a suitable example, demonstrate runtime polymorphism in C++.

(8 Marks)

QUESTION FIVE

a) Explain the purpose of templates in C++ and how they support generic programming. **(7 Marks)**

b) Write a simple C++ template function that returns the maximum of two values. **(8 Marks)**

QUESTION SIX

a) Explain exception handling in C++ and describe the use of try, catch, and throw. **(7 Marks)**
b) Write a C++ program that handles division by zero using exception handling. **(8 Marks)**