



**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCES
DEPARTMENT OF INFORMATICS AND ANALYTICS
PROGRAMMING CONCEPTS AND DEVELOPMENT USING PYTHON
SIA 1204**

**MAIN EXAMINATION PAPER
SECOND SEMESTER 2025**

This examination paper consists of 5 pages.

Time Allowed: 3 hours
Total Marks: 100
Examiner's Name: Mrs C. Chivasa
External Examiner's name: Dr L.C. Sakala

INSTRUCTIONS

1. Answer any four questions
2. Each question carries 25 marks.
3. All questions to be answered in python
4. Use of calculators is permissible.

MARK ALLOCATION

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

QUESTION ONE

a) A bank's ATM provides customers with three essential banking services: depositing money, withdrawing funds, and checking their account balance. Each customer begins with an initial balance of \$500 in their account. Write a program that allows the user to perform multiple transactions through a loop and provides the following options:

- Deposit: Adds a specified amount to the account balance.
- Withdraw: Deducts a specified amount, but only if sufficient funds exist.
- Check Balance: Displays the current account balance.
- Ensures that a withdrawal cannot exceed the available balance, preventing overdrafts.
- Continues allowing transactions until the user chooses to exit. [18]

b) The following script is designed to calculate the sum of numbers from 1 to n, but it doesn't work correctly. Fix the errors.

```
def sum_numbers(n):  
    total == 0  
    for i in range[1, n+1]:  
        total += i  
    print(Total)  
sum_numbers(10)
```

[7]

QUESTION TWO

A hotel management system is being developed to efficiently store and manage different types of guest information. Since various data types have different characteristics, the system must determine the appropriate data structure to use: lists, tuples, or sets.

Write a program that implements the following:

1. A list to maintain a dynamic record of guests currently checked into the hotel, allowing additions and removals as guests arrive and depart.
2. A tuple to store fixed room details, including the room number, type (e.g., single/double/suite), and price per night, ensuring this information remains unchanged.
3. A set to track unique amenities requested by guests, ensuring that duplicate requests for the same amenity are not counted multiple times.
4. User interaction features that allow:
 - Adding and removing guests from the check-in list.
 - Retrieving room details for a given room number.
 - Recording guest amenity requests while preventing duplicate entries. [20]

QUESTION THREE

a) A public library imposes fines on overdue books based on how long they have been kept beyond the due date. The fine structure is as follows: 1 to 5 days overdue charge = \$2 per day, 6 to 10 days overdue: charge = \$3 per day, more than 10 days overdue, a \$50 fine and membership suspension until the fine is cleared. Write a Python program that:

- Prompts the user to enter the number of days a book is overdue.
- Calculates the total fine based on the overdue period.
- Displays the fine amount and, if applicable, a membership suspension notice.

[12]

b) A teacher wants to analyse the exam scores of 30 students. She wants to enter all 30 scores into a list. Then, she needs to find the highest and lowest scores, calculate the average score, count how many students failed (score < 50). Write a Python program that stores exam scores in a list, prints the highest, lowest, and average scores, counts and prints how many students failed.

[13]

QUESTION FOUR

a) The city hospital has struggled with patient prioritisation in its emergency room. With more than 100 patients arriving daily, the hospital needs a way to assess which cases require immediate attention and which can wait. Patients arrive with different symptoms, such as severe chest pain, difficulty breathing, high fever, or minor injuries. The hospital has a system that classifies patients into three priority levels:

- High Priority: Patients in critical condition, such as those experiencing chest pain or struggling to breathe.
- Medium Priority: Patients with serious but stable conditions, such as a fracture or high fever.
- Low Priority: Those with minor issues like a mild cough or an allergy reaction.

With an influx of patients, the hospital staff needs an efficient way to quickly determine the priority level of each patient as soon as they enter the emergency room. Write a program using functions that displays each patient's priority level and allows multiple patients to enter their symptoms based on the following rules:

- High Priority: Severe chest pain, breathing difficulty, head injury.
- Medium Priority: Fracture, high fever, vomiting.
- Low Priority: Cough, mild pain, allergies.

[20]

QUESTION FIVE

a) Explain the following OOP terms

i Polymorphism [2]

ii Encapsulation [3]

b) Define and provide an example for each of the following types of errors:

SyntaxError [2]

IndentationError [2]

TypeError [2]

NameError [2]

ValueError [2]

c) Explain any three programming constructs using code snippets. [10]

END OF QUESTION PAPER