UNIVERSITY Of KIGALI "Unequalled Education Excellence"

# FINAL EXAMINATION

**SCHOOL OF COMPUTING AND INFORMATION TECHNOLOGY**

**PROGRAMME**
Bachelor degree with honours in computer science, Bachelor degree with honours in information technology and Bachelor degree with honours in business information technology

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| **MODULE CODE AND TITLE:**<br>CSC82310: Programming with Python | LEVEL 2, TRIMESTER 4 |
| **DATE:**<br>…/07/2025 | **TIME:**<br>9:30AM-12:30PM<br>**SESSION: Weekend** |
| **DURATION:**<br>3 HOURS | **TOTAL MARKS:**<br>40 |
| **EXAMINER/ LECTURER:**<br>Mr. James Hakizimana | **MODERATOR:**<br>Dr. |

## INSTRUCTIONS TO THE CANDIDATE

1. The exam is Practical. All questions might be done in computer and write the code in booklet provided if possible.
2. All queries should be directed to the invigilator; do not communicate or attempt to communicate with any other candidate.
3. You have **THREE HOURS** to complete this paper. You are not allowed to leave the examination room within the first hour and in the last 15 minutes of this examination.
4. This is a **CLOSED BOOK** examination.
5. Question 1 (Section A) is Compulsory and choose any 3 other questions in Section B.
6. Please, do not write on the question paper.

## SECTION A

**QUESTION 1 (COMPULSORY)**

The Sieve of Eratosthenes is an ancient and efficient algorithm to find all prime numbers up to a given number n.

How it works:

i. Start with a list of numbers from 2 to n.
ii. Begin with the first number (2). It is prime.
iii. Eliminate all multiples of 2 from the list.
iv. Move to the next number that has not been eliminated. It is prime.
v. Eliminate all multiples of this number.
vi. Repeat until you have processed numbers up to √n.
vii. The remaining numbers are primes.

Required:
Write a Python program that uses the Sieve of Eratosthenes algorithm to compute and print all prime numbers less than a given number n. The program should efficiently eliminate non-prime numbers and display the list of primes up to (but not including) n. **( 10 marks)**

## SECTION B

**QUESTION 2**

An NGO is creating a voting eligibility system for a youth election campaign.

- The function should take a person's name and age.
- Check if the person is eligible (age ≥ 18).
- If not eligible, return how many years are left to become eligible.
- Add a second check: if the age is over 120 or less than 0, show an error.
- Display a custom message depending on eligibility.

Required:
Write a function check_voting_eligibility(name, age) that determines and displays the result. **( 10 marks)**

**QUESTION 3**

A local bank wants to provide its clients with a loan tracking tool that shows how their loan balance reduces each month after making fixed payments.

Write a Python program that asks the user to input the total loan amount, the monthly repayment amount, and the number of months for repayment. The program should calculate and print a monthly repayment schedule showing:

The month number, the payment made that month and the remaining loan balance. **( 10 marks)**

**QUESTION 4**

Havard university wishes to upgrade the salaries of their lecturers. They wish to update the basic salary for each lecturer by 10% for the lecturer with years of experience less than 5. For the lecturer with year of experience greater than 5, the increase rate will be 50%.

Required:

a. Create a class named "lecturer" to record first name, surname, email(firstname.surname@havard.ac.us) and basic salary of the lecturer. **(2 marks)**
b. Create sub class named "Permanent_residence" that inherited from" lecturer" class with an additional record "Nationality" of the lecturer. **(1.5 marks)**
c. Create sub class named "Senior_Lecturer" that inherited from "lecturer" class and which increases the salary of the lecturer to 50% for years of experience greater than 5. **(2 marks)**
d. Create method in "lecturer" class that displays the full name and email address of the lecturer. **(1.5 marks)**
e. Create method in "lecturer" class that update the salary of each salary by 10%. **(1.5 marks)**
f. Test your program to Nigerian lecturer, Peter Okolo with 7 years of experience. **(1.5 marks)**

**QUESTION 5**

a. A palindrome is a word, phrase, or sequence that reads the same forwards and backwards, such as "madam" or "racecar". The program should ignore spaces, punctuation, and letter casing when making the comparison. Prompt the user to input a string, and then display whether it is a palindrome or not. Make sure to include comments in your code explaining each major step. Write a Python program to check whether a given string is a palindrome. **(5 marks)**

**b.** Write a Python program that uses **a** lambda function to compute the simple interest**.** The formula for simple interest is:
SI = (P × R × T) / 100**,**
where **P** is the principal amount, **R** is the rate of interest, and **T** is the time in years.
Ask the user to input the values for P**,** R**,** and T, and then use a lambda function to calculate and display the simple interest. **(5 marks)**

**QUESTION 6**

**c.**

A company logs employee attendance with columns:
Employee_ID, Name, Department, Date, Status (Present/Absent)

Using pandas module to:

i. Read the attendance data file.

ii. Count total days present for each employee.

iii. Find employees with more than 5 absences.

iv. Show average attendance per department.

v. Generate a summary table with total present and absent days per employee.

**END**