



Strathmore
UNIVERSITY

SCHOOL OF COMPUTING AND ENGINEERING SCIENCES
BACHELOR OF SCIENCE IN COMPUTER NETWORKS AND CYBERSECURITY
BACHELOR OF SCIENCE IN INFORMATICS AND COMPUTER SCIENCE
END OF SEMESTER EXAMINATION
CNS 1102 & ICS 1102: INTRODUCTION TO PROGRAMMING

DATE: 23rd July 2024

Time: 08:00-10:00 Hours

Instructions

1. This examination consists of **FIVE** questions.
2. Answer **Question ONE (COMPULSORY)** and any other **TWO** questions.

Question One (30 marks)

- a. Distinguish between the following terms as used in programming:
 - i. Logical AND Operator and Logical OR Operator (**2 marks**)
 - ii. One-dimensional and Two-dimensional Array (**2 marks**)
 - iii. Identifier and Keyword (**2 marks**)
- b. What is the output of this Python program? Explain your answer (**2 marks**)

```
i = -3
while i > 0:
    print(i)
    i -=1
```

- c.
 - i. What benefits does a programmer gain by using functions in their code? (**3 marks**)
 - ii. Create a void function in C++ that carries out conversion of Kenya Shillings (KES) to euros (EUR). The function that takes the amount in KES as a parameter and provides the EUR equivalent as an output statement. The rate for conversion is 1 EUR = KES 140. (**4 marks**)

d. Rewrite the following program using an if-else structure in Python **(5 marks)**

```
1 #include <iostream>
2 using namespace std;
3 int main(){
4     char class = 'C';
5     switch(class) {
6         case 'A':
7             cout<<" Motorcycle";
8             break;
9         case 'B':
10            cout<<" Saloon Car";
11            break;
12         case 'C':
13            cout<<" Truck";
14            break;
15         default:
16            cout<<" Special Class";
17            break;
18     }
19     return 0;
20 }
```

e. Referring to the program in question 1(e), highlight the difference between lines 1 and

2. (4 marks)

f. The following is pseudocode for a program being designed.

```
BEGIN
    SET x TO 0, y TO 20
    REPEAT
        SUBTRACT 4 FROM y
        ADD 2/y TO x
    UNTIL
        y IS LESS THAN 6
    DISPLAY x
END
```

i. What is the expected output of the program? Show your working **(3 marks)**

ii. Implement the program in C++. **(3 marks)**

Question Two (15 marks)

- a. Programming is an important skill that can assist in achieving the UN Sustainable Development Goals. Identify one way it can be applied to achieve the goal on:
 - i. Sustainable Cities and Communities [Goal 11] **(1 mark)**
 - ii. Zero Hunger [Goal 2] **(1 mark)**
 - iii. Quality Education [Goal 4] **(1 mark)**
 - iv. Industry, Innovation, and Infrastructure [Goal 9] **(1 mark)**
- b. Using the exchange rate in question 1 (c) part (ii), define another function that converts amounts in euros to Kenya Shillings. The output of this function should be the equivalent amount in KES. **(5 marks)**
- c. Use the functions created in question 1 (c) part (ii) and question 2 (b) to create a C++ program that allows a user to select the currency they wish to convert to, input the amount for conversion and receive output of the converted amount. **(6 marks)**

Question Three (15 marks)

- a. Using code snippets, illustrate any 3 differences in syntax between Python and C++ programming languages **(3 marks)**
- b. Write a C++ program that does the following:
 - i. Declare an array of 5 floating point numbers. **(2 marks)**
 - ii. Uses a loop for a user to continually input values to populate the array. **(5 marks)**
 - iii. Calculates and displays the average of the values input into the array. **(5 marks)**

Question Four (15 marks)

- a. Distinguish between the two forms of low-level programming languages. **(2 marks)**
- b. The following table represents a list of snacks in a vending machine, their costs and respective locations within the machine represented as codes.

Snack	Code	Cost (in KES)
Minute Maid Juice	D4	75
Oreo Cookies	E3	60
Roasted Peanuts	J7	90

Using this information, develop a flowchart that depicts a customer buying their snacks of choice. The algorithm should include a repetitive structure to allow customers to buy as many snacks as they wish and output the final amount due for payment. **(7 marks)**

- c. Write a Python program that implements the algorithm illustrated by question 4(b). Include a comment denoting the type of repetition used in the algorithm. **(6 marks)**

Question Five (15 marks)

- a. Provide any three characteristics of an algorithm. **(3 marks)**
- b. Inspect this C++ program:

```
1 #include <iostream>
2 #include <cmath>
3 float sum, num;
4 int main(){
5     do {
6         std::cout<<"Enter any decimal number between 1 and 3\t";
7         std::cin<<num;
8         sum = num + sum;
9         std::cout<<std::sqrt(sum)<<"\n";
10    } while (num!=1 & num!=2 & num!=3)
11 }
```

- i. Debug this program by rewriting it without any syntax errors. Assume all variables are declared and initialised properly **(3 marks)**
- ii. This program also contains a logical error in that a user can still input decimal numbers below 1 and beyond 3. Rewrite the debugged program in part (i) to rectify this error. **(2 marks)**
- iii. What is the purpose of line 2 as used in the program? **(2 marks)**

c.

- i. Use a for loop to create a C++ program that will output as follows:

```
50 seconds to go
40 seconds to go
30 seconds to go
20 seconds to go
10 seconds to go
GO!
```

(2 marks)

- ii. Implement the program created in part c (i) in Python. **(3 marks)**