



Strathmore
UNIVERSITY

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

DATE: 28th October 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. Variable and Array (**2 marks**)
 - ii. Iterative Structure and Conditional Structure (**2 marks**)
 - iii. Equivalence Operators and Assignment Operators (**2 marks**)
 - iv. Procedural Programming and Object-oriented Programming (**2 marks**)
- b. What is the output of this program? Explain your answer (**2 marks**)

```
int i;  
i = -5;  
do  
{  
    cout << i << endl;  
    i = i - 1;  
}  
while (i > 0);
```

- c. A function, also known as a procedure, is a group of statements that can be called from some point in the program.

- i. What benefits does a programmer gain by using functions in their code? **(3 marks)**
 - ii. Create a function in C++ that calculates and returns the percentage profit given buying price and selling price of an item. Indicate the parameters. **(3 marks)**
- d. Rewrite the following program using a switch statement in C++**(4 marks)**

```

1  cls = 'C'
2  if cls == 'A':
3      print("Motorcycle")
4  elif cls == 'B':
5      print("Saloon Car")
6  elif cls == 'C':
7      print("Truck")
8  else:
9      print("Special Class")

```

- e. Referring to the programs in question 1(d), highlight the difference between switch statement and Nested if. **(4 marks)**
- f. The following is pseudocode for a program being designed.

```

BEGIN
    SET r TO 5.5, t TO 5
    REPEAT
        r = r * (2/t)
        t = t - 1
        PRINT r
    UNTIL t is 0
END

```

- i. What is the expected output of the program? Show your working **(3 marks)**
- ii. Using C++ implement the logic represented by the pseudocode. **(3 marks)**

Question Two (15 marks)

- a. Using examples, discuss why we use algorithms in programming. **(3 marks)**
- b. Kenya's tourism industry is booming, and you are developing a system to calculate tour costs for different packages.

The table below shows the different packages and rates.

Package	Cost(Per person)
Safari	ksh.15,000
Beach	ksh.10,500
Mountain	ksh.12,000

The prices are per person, per night. A guest may have a promotion code

“MAGICALKENYA” which they can input to get a 10% discount for their package.

Using this information, develop a flowchart showing the booking process that gives the user an output showing their total cost in kenya shillings and the number of days and nights. **(6 marks)**

- c. Using the flowchart in question 2(b), write a python program that implements the algorithm shown. **(6 marks)**

Question Three (15 marks)

- a. Rewrite the following Python code in C++. **(3 marks)**

```
n=int(input("Enter a non-negative integer"))
while n<0:
    print("The integer you entered in non-negative")
    n = int(input("Enter a non-negative integer"))
```

- b. Write a C++ program that does the following:
- Declare an array of 5 floating point numbers. **(2 marks)**
 - Uses a loop for a user to continually input values to populate the array. **(5 marks)**
 - Calculates and displays the sum of all the values input into the array. **(3 marks)**
 - Find and display the highest value entered into the array. **(2 marks)**

Question Four (15 marks)

- a. Identify the errors in this snippet of Python code. Explain your choices.(3 marks)

```
temp == float(input("Input temperature:"))
if (temp > 40):
    print("Error!")
elif (temp > 25):
    print ("Hot")
elif (temp > 10):
    print("Normal");
elif (temp > 0):
    print("Cold")
else (temp < 0):
    print("Invalid!")
```

```
temp == float(input("Input temperature:"))

if(temp > 40):

    print("Error!")
elif(temp > 25):
    print("Hot")
elif(temp > 10):
    print("Normal");
elif (temp > 0):
    print("Cold")
else(temp < 0):
    print("Invalid!")
```

- b. Describe any two types of errors that programmers can encounter in their workflow and how they can recover from each. (2 marks)
- c. Explain the two types of loops as used in programming clearly outlining the difference between the two loops. (4 marks)
- d.
- I. Using a while loop in C++, print the first 10 multiples of 3.(3 marks)
 - II. Write a Python program that implements the program created in (i) above. (3 marks)

Question Five (15 marks)

- a.** Your friend Lilian wants to start her programming journey and has come across two IDEs: Pycharm for Python programming and CLion for C++ programming.
- I.** As a programming student, how would you explain the difference between the two IDEs, in terms of their build automation tools? **(4 marks)**
 - II.** What are some of the considerations that Lillian should make when selecting an IDE to use when starting her programming journey? **(2 marks)**
- b.** M-KOPA Solar, a startup in Kenya that provides affordable solar power lighting and appliances to off-grid households, has tasked you, a new cyber security networks junior associate, with explaining how you apply your programming skills in your role. **(5 marks)**
- c.** Write a program in C++ that asks a user to input the names of different plants until the user enters END.
The program should print: "You have entered x plants." x being the total number of plants entered and finally print "This is all." **(4 marks)**