



SCHOOL OF COMPUTING & ENGINEERING SCIENCES
BACHELOR OF SCIENCE IN COMPUTER NETWORKS & CYBER SECURITY
CNS 1102: INTRODUCTION TO PROGRAMMING
END OF SEMESTER EXAM

Date: 31st July 2023

Time: 2 Hours

Instructions:

This Examination consists of **FIVE** questions

Answer **Question ONE (COMPULSORY)** and any other **TWO** questions.

Question One [30 Marks]

- a. Construct logical expressions in **C++** to represent each of the following conditions [3 Marks]
- i. score is greater than or equal to 80 but less than 90
 - ii. answer is either 'N' or 'n'
 - iii. Age is greater than or equal to 18 and gender is male
- b. Using examples, distinguish between equivalence and assignment operators in programming [4 Marks]
- c. The program below calculates the cost of a burger in pounds at a fast food restaurant. A standard burger costs £6.50 with additional toppings and eating in the restaurant

```
1 STANDARD = 6.5
2 toppings = 0
3 eat_in = False
4 toppings = int(input("How many toppings?: "))
5 eat_in = input("Are they eating in?: ")
6 if eat_in == True:
7     print(STANDARD + 0.5 * toppings + 1)
8 else:
9     print(STANDARD + 0.5 * toppings)
```

- i. List all the variables in this program **[3 Marks]**
 - ii. How much extra does it cost to eat a burger inside the restaurant **[2 Marks]**
- d. Determine the output of the program below if the user inputs 5, 10, 2, 3, 4,-1. Use a table to track the variables through the different iterations **[4 Marks]**

```
int value = 1;
int input;
do
{
cin >> input;
value = value * input;
} while (input != -1);
cout << value * -1 << endl;
```

- e. Every year that is exactly divisible by four is a leap year, except for years that are exactly divisible by 100, however, these years are leap years if they are exactly divisible by 400. For example, the years 1700, 1800, and 1900 were not leap years, but the years 1600 and 2000 were.

Draw a flowchart to represent an algorithm for a program to determine whether a year provided by a user is leap or not based on this description **[4 marks]**.

- f. The following values are contained in an array named *characterCode*, answer the below questions based on this statement.

[45, 63, 126, 128]

- i. Write C++ statements to declare and initialize the array **[4 Marks]**
 - ii. Which data element will be replaced by the below statement **[2 Marks]**
 $characterCode [3] = 105$
- g. Write a function in C++ that converts kilometers per hour to miles per hour.
Note: 1 mile = 1.60934 km **[4 Marks]**

Question Two [15 Marks]

Figure 1 provides a comparison of some popular programming languages. Use it to answer the questions that follow

- i. Discuss possible reasons why python is described as being relatively slower than other languages provided in the table **[3 Marks]**
- ii. Identify and describe a software application that you would develop using java script and explain why it would be the most suitable programming language **[3 Marks]**

- iii. Lua, Python and JavaScript adopt both a procedural and object-oriented programming styles as opposed to Java that is object oriented. Describe procedural programming style and discuss the potential benefits of this style in comparison to Object Oriented [6 Marks]
- iv. Provide a detailed distinction between compiled vs interpreted programming languages [3 Marks]

	Lua	Python	Java	JavaScript
Language Type	Scripting language	General purpose programming language	General purpose programming language	Web-focused programming language (Supports client- & server-side)
Usage	Embedded scripting	Multiple (From web development to data analytics)	Multiple (Desktop/mobile apps to Enterprise apps & services)	Web app development (Frontend & backend)
Compiled vs Interpreted	Compiled	Interpreted	Compiled	Interpreted
Package Management	Third-party tools (LuaRocks, LuaDist)	Pip	Maven & Gradle	NPM (Node Package Manager)
Programming Styles	<ul style="list-style-type: none"> • Procedural • Object-oriented • Functional • Data-driven 	<ul style="list-style-type: none"> • Imperative • Functional • Object-oriented • Procedural 	<ul style="list-style-type: none"> • Object-oriented 	<ul style="list-style-type: none"> • Procedural • Object-oriented
Ease of use (Syntax)	Simple	Simple	Complex	Simple
Speed	Fastest	Relatively slow	Fast	Faster
Platform Support	Multi-platform	Multi-platform	Multi-platform	Multi-platform (Web oriented)

Figure 1: A comparison of popular programming Languages

Question Three [15 Marks]

Use the code below to answer the questions that follow

```
total = 0

number = int(input('Enter a number: '))

while number != 0:
    total += number
    number = int(input('Enter a number: '))

print('total =', total)
```

- Describe the purpose of the code [2 Marks]
- Determine the output of the program if the user inputs the following series of numbers 3, 7, 1, 5, 9,0 [3 Marks]
- Rewrite the program using the for loop in C++ [4 Marks]
- Write a program in C++ that asks a user to input the names of different animals until the user enters *END*. When they are done, print "*I am done.*" [6 Marks]

Question Four [15 Marks]

- Declare an array of integers named *Dart_Throws* which can hold 20 integers [3 Marks]
- Write a short segment of code to assign each of the elements of the array declared in part (a) to 0 using a loop [4 Marks]
- Explain the difference between user-defined and pre-defined functions [2 Marks]
- Write a program in C++ that prompts a user to input two numbers, pass the numbers to a function and then display largest number [6 Marks]

Question Five [15 Marks]

- Rewrite the below code fragment in python [4 Marks]

```

if(temperature< -10 && (day=="Sunday"))
    cout<<"Stay Home";
else if (temperature< -10)
    cout<<"Stay Home, but call work";
else if (temperature<=0)
    cout<<"dress warm";
else
    cout<<"Work hard and play hard";

```

- Rewrite the below code segment using if statement [4 Marks]

```

switch (answer)
{
case 0: cout<<"0 entered"; break;
case 1: cout<<"1 entered"; break;
case 3: cout<<"2 entered"; break;
case 5: cout<<"3 entered"; break;
default: cout<<"Other value entered";
}

```

- Write the program to implement the algorithm represented by the description provided in question 1(d) [7 Marks]