



**THE UNIVERSITY OF THE WEST INDIES
FIVE ISLANDS CAMPUS**

Semester II

Examinations of April/May 2023

Course Code: COMP0001
Course Title: Preliminary Computer Science 1
Date of Assessment: 02/05/2023
Time: 09:00am
Duration: Two (2) Hours

INSTRUCTIONS TO CANDIDATES:

This paper has 6 pages and 13 questions.

YOU ARE REQUIRED TO ANSWER ALL QUESTIONS.

THIS ASSESSMENT IS WORTH 50 % OF YOUR FINAL GRADE.

ASSESSMENT DETAILS FROM INSTRUCTOR(S):

- 1. Answer all questions from section A.**
- 2. For Section B, Answer ALL questions from either part I or from part II NOT both.**

Section A (30 Marks): Answer all questions from this section

- A. Showing all working. Find the largest and smallest integers that can be represented using 4 bits twos complement. Give your answers in denary. [2 marks]
- B. Showing all working. Write the decimal integer 356 in unsigned binary format [2 mark]
- C. Using two's complement addition, subtract +63 from -57, show your answer using 8 bits. Be sure to show all working. [3 marks]
- D. Produce the logic circuit and complete a truth table to represent the following scenario.

[5 marks]

Your friend Bill James would like you to design a security alarm system for his house. The security alarm should sound if the alarm switch is enabled (turned on) and a window or door is opened. For example, if the alarm switch is enabled and a window is opened, the alarm should sound.

This table describes the process conditions being monitored.

Parameter description	Parameter	Binary Value	Description of condition
Alarm system	A	0	disabled
		1	enabled
Door sensor	D	0	closed
		1	open
Window sensor	W	0	closed
		1	open

- E. Briefly describe any three (3) of the five (5) main operating system tasks. [3 marks]
- F. Figure 1 below shows an algorithm using pseudocode.

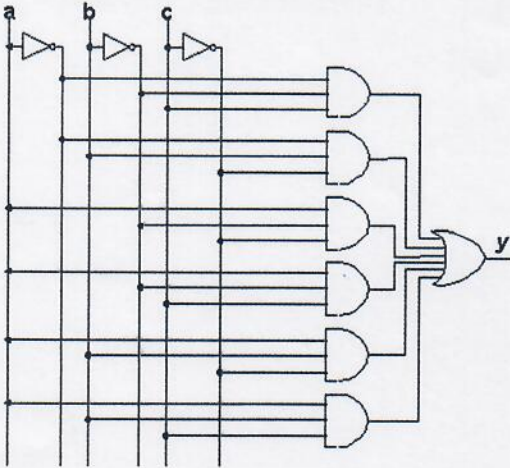

```
begin
read name
if name = 'enddata'
    print 'no data supplied'
else
    while name <> 'enddata'
        read amount
        read quantity
        sale = amount * quantity
        print 'This sale = ', sale
        read name
    endwhile
endif
end
```

Figure 1 Pseudocode

Construct a flowchart to represent the algorithm in Figure 1. [5 marks]

G. Use the laws of Boolean algebra to simplify: $((A \cdot B') + (A' \cdot B))' \cdot (A + B)$ [3 marks]

H. Consider the circuit below:



- Write down the Boolean expression to represent the logic circuit [2 marks]
- Produce the Karnaugh map to represent the above logic circuit and hence write down a simplified Boolean expression. [3 marks]
- Draw a simplified logic circuit from your Boolean expression in part b) using any of the basic logic gates. [2 marks]

Section B (20 Marks): Choose to answer questions from either part I or from part II NOT both

Part I

1. Write a program that allows a user to enter the ages of ten (10) friends and prints out the total age and the average age. The program then reports adults if the average age is 18 or over, and underage otherwise.
[10 marks]
2. Write a function with the following header that finds the result of a base raised to an exponent. The base and exponent are both positive integers. You may use either repetition or recursion, but NOT the ** operator.
[5 marks]

```
def power(base, expt):
    # Fill in your code here
```

Show that power() works correctly with the input 2^4 and 5^3 .

3. Find error(s) in the following code(if any) and correct code by rewriting code and underline the correction. The code should print all the values between 0 and the value the user enters (inclusive of both 0 and the value entered) indicating whether each value is “even” or “odd”.
[5 marks]

```
1. x= int("Enter value of x:")
2. for y in range [0, x]:
3.     if y % 2 = 0
4. print( x, even)
5.     else:
6. print( x, odd)
```

Part II

4. Write a function to display a numeric pattern as follows for any number of lines, n: [10 marks]

```
1
2 3
4 5 6
7 8 9 10
11 12 13 14 15
16 17 18 19 20 21
```

The function header is `def displayPattern(n):`

```
def main():
    # Enter the number of lines
    n = eval(input("Enter n: "))
    displayPattern(n)
def displayPattern(n):
    # Fill in the code here
```

5. Show the printout of the following code:
a. [5 marks]

```
def halve(n):  
    a = n  
    while a > 1:  
        a = int(a / 2)  
        n = n + a  
        print (a)  
    print(n)
```

halve(25)

b. [2 marks]

```
for x in range(0,11,5):  
    for y in range(3):  
        print(x,y)
```

c. [3 marks]

```
def power (b , p):  
    r = b ** p  
    return r  
def calcCube(side):  
    volume = power (side, 3)  
    return volume  
n = 7  
result = calcCube(n)  
print (result)
```

END OF QUESTION PAPER