PENINSULA COLLEGE GEORGETOWN

TAKE HOME EXAMINATION

Student NRIC : _____

Student ID : _____

Programme	:	**DIPLOMA IN COMPUTER SCIENCE (MQA/PA13808)**
Intake	:	**MAY 2021 (YEAR 1 SEMESTER 1)**
Course	:	**PROBLEM SOLVING IN COMPUTING**
Course Code	:	**DCS1253**
Duration	:	**(3 hours)**

INSTRUCTIONS TO CANDIDATES:

1. Please read the instructions given in the question paper **CAREFULLY.**
2. This question paper consists of **FOUR (4)** questions.
3. Answer **ALL** questions.
4. Answers to the questions are to be written into own A4 sized papers.
5. Please write your NRIC number or student ID number on every page of your answer script. **Do NOT** write your name.
6. Please write page number on every page of your answer script.
7. Please **KEEP** the hardcopy of your answer script.
8. 1 mark will be deducted for every minute delay in submission after the 20 minutes lapse with maximum of 10 minutes delay is allowed.
9. After 1.30 pm, any submission will **NOT** be accepted, 0 marks will be awarded.

WARNING:

The Examination Board of Peninsula College Georgetown regards cheating as a most serious offence and will not hesitate to mete out the appropriate punitive actions according to the severity of the offence committed, and in the accordance with the clauses stipulated in the Students' Handbook, up to and including expulsion from Peninsula College Georgetown.

(*This booklet contains 4 printed pages including this page*)

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE ALLOWED TO DO SO

Answer **ALL FOUR (4)** questions on the separate sheet provided. **[100 marks]**

1. a) Create an Input-Process-Output (IPO) chart for the following sub-questions.

   i) A program will accept the distance travelled by a car and the time it took to reach its destination and calculate the speed at which it travelled. Then, the program will display the speed of the car. (8 marks)

   ii) A program will accept the amount of money paid on a product as well as the price. It will calculate the balance owed to the store， then the system will display the amount paid, the product price and the balance. (9 marks)

   b) Design a flowchart for a program that calculates the current balance in a savings account. The program must ask the user for:
   – The starting balance
   – The total dollar amount of deposits made
   – The total dollar amount of withdrawals made
   – The monthly interest rate
   Once the program calculates the current balance, it should be displayed on the screen. (8 marks)

2. a) Analyze the output for each of the following programs. You might be hand traced and require a calculator.

   i) *(Assume the user enters **36720152**. Use a calculator.)*

```
1  #include <iostream>
2  #include <iomanip>
3  using namespace std;
4  int main()
5  {
6      long seconds;
7      double minutes, hours, days, months, years;
8      cout << "Enter the number of seconds that have\n";
9      cout << "elapsed since some time in the past and\n";
10     cout << "I will tell you how many minutes, hours,\n";
11     cout << "days, months, and years have passed: ";
12     cin >> seconds;
13     minutes = seconds / 60;
14     hours = minutes / 60;
15     days = hours / 24;
16     years = days / 365;
17     months = years * 12;
18     cout << setprecision(4) << fixed << showpoint << right;
19     cout << "Minutes: " << setw(6) << minutes << endl;
20     cout << "Hours: " << setw(6) << hours << endl;
21     cout << "Days: " << setw(6) << days << endl;
22     cout << "Months: " << setw(6) << months << endl;
23     cout << "Years: " << setw(6) << years << endl;
24     return 0;
25 }
```

(5 marks)

ii)

```
1  // This program demonstrates how setprecision rounds a
2  // floating point value.
3  #include <iostream>
4  #include <iomanip>
5  using namespace std;
6
7  int main()
8  {
9      double quotient, number1 = 132.364, number2 = 26.91;
10     quotient = number1 / number2;
11     cout << quotient << endl;
12     cout << setprecision(5) << quotient << endl;
13     cout << setprecision(4) << quotient << endl;
14     cout << setprecision(3) << quotient << endl;
15     cout << setprecision(2) << quotient << endl;
16     cout << setprecision(1) << quotient << endl;
17     return 0;
18 }
```

(5 marks)

b) Write C++ statements to let the user enter 12 numbers into an array of doubles. (5 marks)

c) Write a ***for*** loop to calculate the highest number of an array consisting of 12 numbers. (5 marks)

d) Create a ***for*** loop that calculates the lowest number of the array consisting of 12 numbers. (5 marks)

3. a) Write a program that calculates and displays a person's body mass index (BMI). The BMI is often used to determine whether a person with a sedentary lifestyle is overweight or underweight for his or her height. A person's BMI is calculated with the following formula:

$$BMI = weight \times height^2$$

where *weight* is measured in kilogram and *height* is measured in meter. The program should display a message indicating whether the person has optimal weight, is underweight, or is overweight. A sedentary person's weight is considered to be optimal if his or her BMI is between 18.5 and 25. If the BMI is less than 18.5, the person is considered to be underweight. If the BMI value is greater than 25, the person is considered to be overweight. (10 marks)

b) A software company sells a package that retails for RM99. Quantity discounts are given according to the following table.

Quantity	Discount
1-10	0%
10-19	20%
20-49	30%
50-99	40%
100 or more	50%

Write a program that asks for the number of units sold and computes the total cost of the purchase.
Input Validation: Make sure the number of units is greater than 0. (15 marks)

4. Code the functions below for a program to get the rectangle's area and perimeter. (Note: You do not code a complete program.)

   a) getLength – This function should ask the user to enter the rectangle's length and then return that value as a double. (5 marks)

   b) getWidth – This function should ask the user to enter the rectangle's width and then return that value as a double. (5 marks)

   c) getArea – This function should accept the rectangle's length and width as arguments and return the rectangle's area. The area is calculated by multiplying the length by the width. (5 marks)

   d) getPerimeter – This function should accept the rectangle's length and width as arguments and return the rectangle's perimeter. The perimeter is calculated by adding all the sides of the rectangle. (5 marks)

   e) displayData – This function should accept the rectangle's length, width, area and perimeter as arguments and display them in an appropriate message on the screen. (5 marks)

- END OF QUESTIONS -