CONFIDENTIAL

UNIVERSITI TEKNOLOGI MALAYSIA
FACULTY OF COMPUTING

TEST 1

SEMESTER I 2022/ 2023

SUBJECT CODE : SECJ1013

SUBJECT NAME : PROGRAMMING TECHNIQUE I

YEAR/COURSE : 1 (SECJH/SECVH/SECBH/SECRH/SECPH)

TIME : 8.00 PM – 10.00 PM (2 HOURS)

DATE : 13th DECEMBER 2022 (TUESDAY)

VENUE : BK22, LEVEL 8 (08.48.01)

INSTRUCTIONS TO THE STUDENTS:

This test book consists of two parts:

PART A:	4 QUESTIONS	(40 MARKS)
PART B:	6 QUESTIONS	(60 MARKS)
TOTAL		**(100 MARKS)**

ANSWER ALL QUESTIONS IN THIS BOOKLET IN THE SPACES PROVIDED.

Name	
Matric No.	
Section	
Lecturer's Name	

This question booklet consists of **14 pages** inclusive of the cover page.

PART A: PROBLEM-SOLVING QUESTIONS **[40 MARKS]**

QUESTION 1 **(7 Marks)**

UTM Homestay offers two rental packages to its customers. The following is the rental cost for each package:

Package	Rental Price per Night (RM)
Weekday	150
Weekend/ Public Holiday	250

Customers must pay a deposit of 10% of the rental cost prior to placing an order. Customers who are regular customers receive a 25% discount. Complete the following pseudocode, which prompts users to enter their name, length of stay, package (1 - Weekday, 2 - Weekend/ Public Holiday), and customer type (R - Regular, N - Normal). The pseudocode should calculate and display the customer's name, deposit payment, total discount given (if any), and the remaining rental cost to be paid.

```
1.  Start
2.  deposit = 0.1
3.  Get name, duration, package, custType
4.  _____________________________________________________________
    4.1 _____________________________________________________
5.  _____________________________________________________________
    5.1 _____________________________________________________
6.  End_If
7.  _____________________________________________________________
    7.1 _____________________________________________________
8.  _____________________________________________________________
    8.1 _____________________________________________________
9.  End_If
10. price = rental * duration
11. dep_payment = deposit * price
12. tot_discount = disc * price
13. _____________________________________________________________
14. Display name, dep_payment, tot_discount, balance
15. End
```

QUESTION 2 **(8 Marks)**

Determine the output for each run of the following pseudocodes for the inputs listed in **Tables 1** and **2**. Fill out both tables with your answers.

a) Pseudocode 1 (4 marks)

```
1.  Start
2.  Read i
3.  If (i > 5)
    3.1 If (i > 10)
        3.1.1 j = i / 50 * 5;
    3.2 Else
        3.2.1 j = 50 / i * 5;
    3.3 End_If
4.  Else
    4.1 j = 5 * i / 50;
5.  End_If
6.  Print j
7.  End
```

Table 1: Tracing table for Question 2(a)

i	Output
2	
5	
10	
20	

b) Pseudocode 2 (4 marks)

```
1.  Start
2.  price = 0
3.  Read unitsUsed, usageType
4.  If (usageType = "Casual")
    4.1 If (unitsUsed > 0) AND (unitsUsed <= 200)
        4.1.1 price = unitsUsed * 0.8
    4.2 Else_If (unitsUsed > 200) AND (unitsUsed <= 999)
        4.2.1 price = unitsUsed * 0.7
    4.3 Else
        4.3.1 price = unitsUsed * 0.5
    4.4 End_If
5.  Else
    5.1 If (unitsUsed > 0) AND (unitsUsed <= 200)
        5.1.1 price = unitsUsed * 0.6
    5.2 Else_If (unitsUsed > 200) AND (unitsUsed <= 999)
```

```
        5.2.1 price = unitsUsed * 0.3
    5.3 Else
        5.3.1 price = unitsUsed * 0.2
    5.4 End_If
6.  End_If
7.  If (price = 0)
    7.1 Display "Invalid Input"
    7.2 Goto 10
8.  End_If
9.  Display price
10. End
```

Table 2: Tracing table for Question 2(b)

unitsUsed	usageType	Output
300	Casual	
150	Heavy	
1020	Casual	
0	Heavy	

QUESTION 3 **(12 Marks)**

Determine the output of the flowchart in **Figure 1** by tracing the value of the variables. Complete the tracing table in **Table 3** to write your answers. Finally, show your calculations for variable ***nit***, ***sum*** and ***res***.

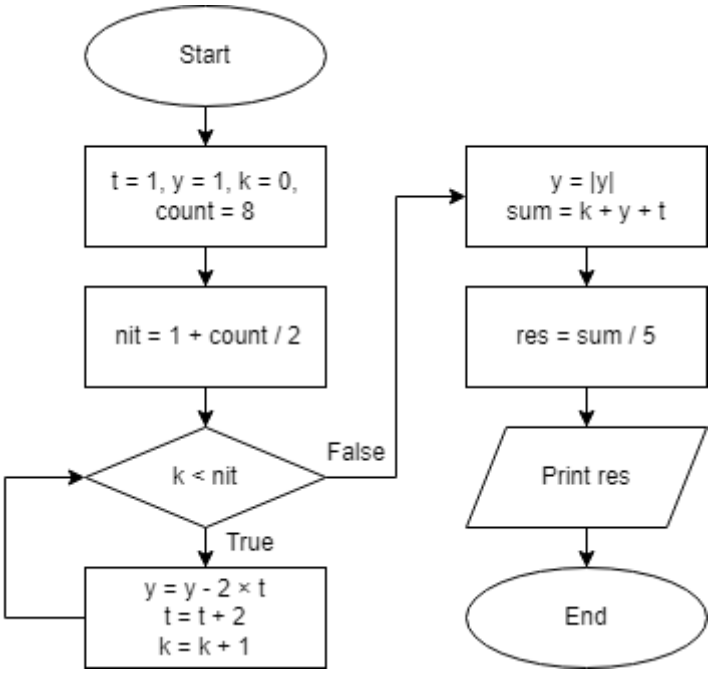

Figure 1: Flowchart for Question 3

Table 3: Tracing table for Question 3

t	y	k	k < nit	Output
1	***1***	***0***		
Calculation:				

QUESTION 4 **(13 Marks)**

Draw a flowchart to calculate the price of a house of type A with a size greater than 900 square feet. The steps for calculating the house price type A are as follows:

a) Get the size of the house. ***Input validation:*** if the house size is 900 or less, prompt the user to enter it again until a valid house size is entered.

b) Get the house type. ***Input validation:*** if the type is not A, prompt the user to enter the house type again until a valid house type is entered.

c) Then, call the user-defined function "calcPrice". ***Note:*** The calculation of the house price must be done only in the user defined function "calcPrice", so a variable must be passed from the main function (main flowchart) for the calculation. The price value must be returned to the main function once the calculation is finished. The price will only be displayed in the main function.

d) Finally, display the price of a type A house.

The house price formula is as follows: ***price = 99.47 × house size (in square feet)***, where RM 99.47 is the price per square feet. For example, if the user enters 1000 square feet as the size of the house, the total price will be RM 99,470.00.

Answer:

PART B: PROGRAMMING QUESTIONS **[60 MARKS]**

QUESTION 1 **(10 Marks)**

Given the following declaration:

```
int a = 8, b = 12, c = 25, d = 4, x;
float f = 4.5;
```

Trace the values of each variable in the statements below. Highlight the changes in the values of each variable as you go through the calculation steps one by one based on operator precedence and associativity. Assume that each statement is executed independently.

Example:

```
x = c - a + b;
x = 17 + 12
x = 29
```

a) `x = a + b * (c++ / 31 % 13) - d;` (3 marks)

Answer:

b) `f -= b * ++a % static_cast<int>(f) + d;` (3 marks)

Answer:

c) `d += 5 * 3 + (a++);` (2 marks)

Answer:

d) `x = (d + ++b - f);` (2 marks)

Answer:

QUESTION 2 **(5 Marks)**

Determine the output for the program segment shown in **Table 4**. Fill in the **Output** column of the table with your answers.

Table 4: Program segment and output for Question 2

Line	Code	Output
1	`int h = 12, k = 7;`	
2	`bool m = false;`	
3		
4	`cout << ((h == 12) || (h > k)) << endl;`	
5	`cout << ((h != 12) && (k = h)) << endl;`	
6	`cout << ((h = 10) && (k = m)) << endl;`	
7	`cout << ((h == 10) || !(h >= m)) << endl;`	
8	`cout << ((h != 10) && (k != m)) << endl;`	

QUESTION 3 **(12 Marks)**

Complete and write the code segment of the **`main()`** function for the following problems:

a) Using **`switch-case`** statements, display the description based on the table below.

Code	Description
1	Special
2 and 4	Even
Below 1 and Above 4	Awkward

(6 marks)

Answer:

```
int main()
{
   int code;
   cout << "Enter code: ";
   cin >> code;









   return 0;
}
```

b) Using **`if-else`** statements, find and display the largest number from the three numbers entered by the user. (6 marks)

Answer:

```
int main()
{
   int n1, n2, n3, largest;
   cout << "Enter 3 numbers: ";
   cin >> n1 >> n2 >> n3;









   cout << "Largest number: " << largest;
   return 0;
}
```

QUESTION 4 **(13 Marks)**

Based on the C++ program below:

```
1   #include <iostream>
2
3   int main() {
4    int i = 25;
5    while (i > 0) {
6      for (j = i; j > 0; j =- 5) {
7        if (i + j) % 4 != 0;
8          continue;
9        else
10         cout << "j = " << --j;
11           << " i = " << i << endl;
12     }
13     i =/ 2;
14   }
15  }
```

a) Identify and correct any syntax and/or logical errors in the program by writing the corrected statements in **Table 5**. Only the corrected statements need to be written in the table.

(7 marks)

Table 5: Answer for Question 4(a)

Line	Corrected Statements

b) What is the program's output after the errors have been corrected? (6 marks)

Answer:

QUESTION 5 **(10 Marks)**

What is the output of the program segment below?

```
1   int x = 0, y;
2   bool z = true;
3
4   if (x++)
5     y = 10;
6   else
7     y = 5;
8
9   cout << "x: " << x << endl;
10  cout << "y: " << y << endl;
11
12  y += z;
13  cout << "y: " << y << endl;
14
15  while ((x < y) && z == true) {
16    x += 1;
17    if (x == 3)
18      z = false;
19    cout << "x = " << x << endl;
20  }
21
22  z = (z != y);
23  cout <<"z is " << z << endl;
24
25  if (x <= y)
26    x++;
27  cout << "x is " << x << endl;
28  cout << (x > z) << endl;
29  cout << (y == z) << endl;
30  cout << (!x != !y) << endl;
```

Answer:

QUESTION 6 **(10 Marks)**

The distance travelled by a vehicle can be calculated as follows:

*distance = speed * time*

For example, if a car travels 40 kilometres per hour for 3 hours, the total distance travelled is 120 km. Complete the C++ program below, which asks the user for the speed of a vehicle (in kilometres per hour) and the number of hours it has been travelling. The program should then use a loop to display the distance travelled by the vehicle during each hour of that time period. Here are some examples of the output:

Example 1:

```
What is the speed of the vehicle in km/h? -60
Please enter a non-negative number for speed: 140
For how many hours has it travelled? 2

Hour    Distance Travelled in km
---------------------------------
1       140
2       280
```

Example 2:

```
What is the speed of the vehicle in km/h? -5
Please enter a non-negative number for speed: -60
Please enter a non-negative number for speed: 90
For how many hours has it travelled? 0
Please enter a 1 or greater for hours: -1
Please enter a 1 or greater for hours: 4

Hour    Distance Travelled in km
---------------------------------
1       90
2       180
3       270
4       360
```

Example 3:

```
What is the speed of the vehicle in km/h? 110
For how many hours has it travelled? 0
Please enter a 1 or greater for hours: 3

Hour    Distance Travelled in km
---------------------------------
1       110
2       220
3       330
```

The **bold** text in the above output represents user input. ***Input validation:*** Do not accept negative numbers for speed or any value less than 1 for time travelled.

Answer:

```
#include <iostream>
using namespace std;

int main() {
   double speed, hours, distance;









   return 0;
}
```