



**UTM**  
UNIVERSITI TEKNOLOGI MALAYSIA

**SCHOOL OF COMPUTING**  
Faculty of Engineering

**UNIVERSITI TEKNOLOGI MALAYSIA**

**TEST 1 (WRITTEN)**

**SEMESTER I 2019/ 2020**

**SUBJECT CODE** : SECJ/ SCSJ 1013

**SUBJECT NAME** : PROGRAMMING TECHNIQUE I

**YEAR/COURSE** : 1 (SECJ/ SECV/ SECB / SECR / SECP/ SCSJ/ SCSR)

**TIME** : 2.30 PM – 5.00 PM (2½ HOURS)

**DATE** : 22<sup>nd</sup> OCTOBER 2019 (TUESDAY)

**VENUE** : BK1 – BK7, N28

**PART B**

Q1 - 6

Q2 - 0

Q3 - 5

Q4 - 4

Q5 - 6.5

Q6 - 17

**INSTRUCTIONS TO THE STUDENTS:**

total = 38.50

This test book consists of two parts:

**PART A:** 6 QUESTIONS (50 MARKS)

**PART B:** 6 QUESTIONS (50 MARKS)

**TOTAL** (100 MARKS)

**ANSWER ALL QUESTIONS IN THIS BOOKLET IN THE SPACES PROVIDED.**

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Section	05
Lecturer's Name	Mr. Lili Suhaimi bin Yusof

This question booklet consists of **16 pages** inclusive of the cover page.

**PART A: PROBLEM-SOLVING QUESTIONS****[50 MARKS]****QUESTION 1****(6 MARKS)**

Complete the following pseudo code that adds two integer numbers between 1 and 5 (1 and 5 are included). The pseudo code will require an input of two integer numbers. The program able to request repetitively from the user to key in the number again if the number entered is out of range from 1 to 5. Use a proper input validation to handle this situation. Then, the pseudo code will continue to calculate the total of two integer numbers after valid numbers entered. Finally, the pseudo code will display the total of two numbers.

1. Start
2. Read num1
3. If  $(\text{num1} < 1) \text{ or } (\text{num1} > 5)$  / (F)
  - 3.1 Goto 2
4. End If
5. Read num2
6. If  $(\text{num2} < 1) \text{ or } (\text{num2} > 5)$  /
  - 6.1 Goto 5
7. End If
8.  $\text{total} = \text{num1} + \text{num2}$  /
9. Display total
10. End

**QUESTION 2****(6 MARKS)**

Determine the output for each run of the following pseudo code for the given inputs in **Table 1**. Write your answers by completing the **Table 1**.

1. Start
2. Read BookUnits 12, 12
3. Set BookRetailPRICE = 99
4. If (BookUnits  $\geq 1$ ) AND (BookUnits  $< 5$ )
  - 4.1 BookTotalCost = BookUnits  $\times$  BookRetailPRICE
5. Else\_If (BookUnits  $\geq 5$ ) AND (BookUnits  $< 15$ )
  - 5.1 BookRetailCost = BookUnits 12  $\times$  BookRetailPRICE
  - 5.2 BookTotalCost = BookRetailCost - (BookRetailCost  $\times$  .20)
6. Else\_If (BookUnits  $\geq 15$ )
  - 6.1 BookRetailCost = BookUnits  $\times$  BookRetailPRICE
  - 6.2 BookTotalCost = BookRetailCost - (BookRetailCost  $\times$  .40)
7. Else
  - 7.1 Display "No book been purchased"
  - 7.2 Goto 10
8. End\_If
9. Display BookTotalCost
10. End

6

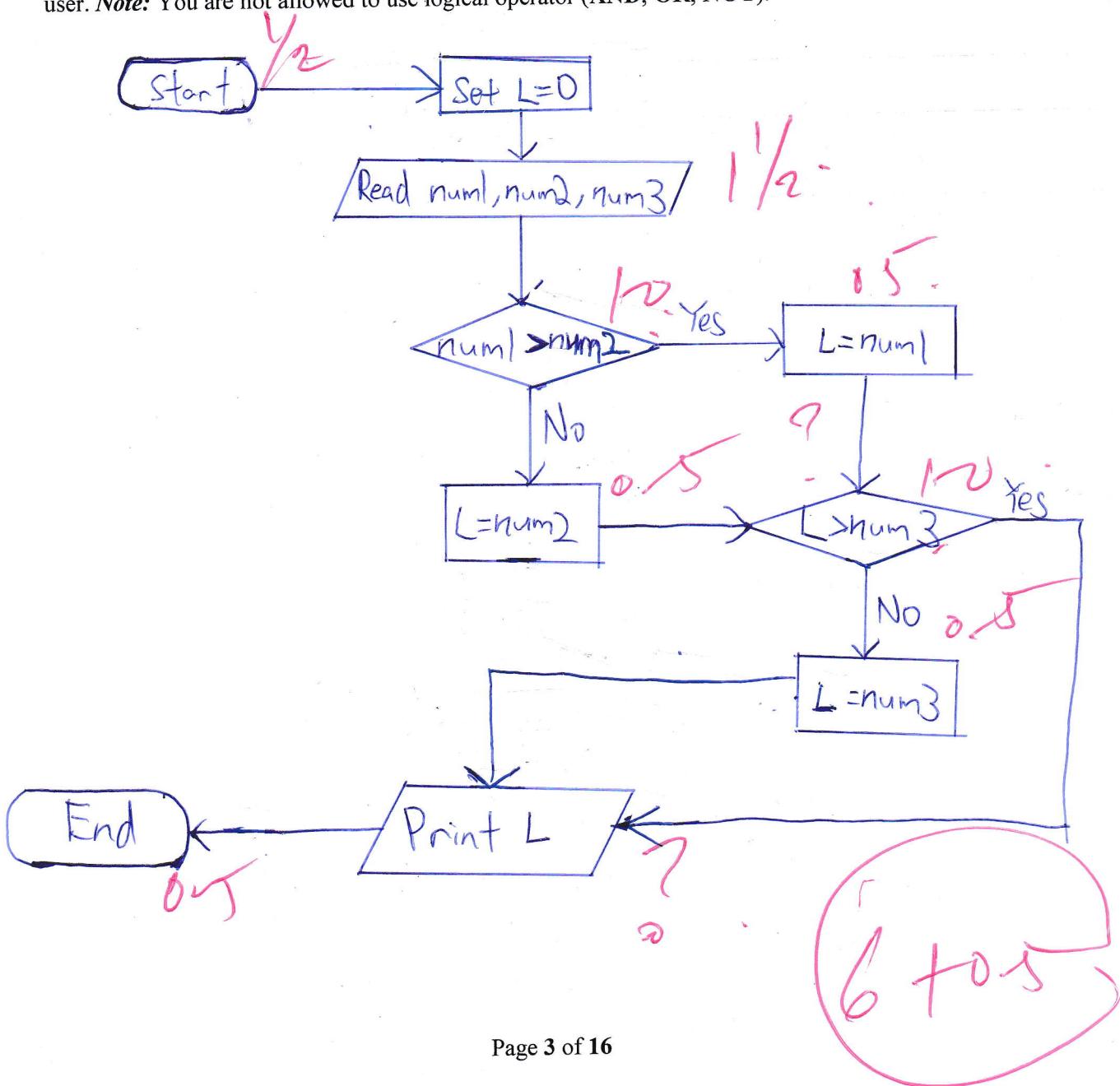
Table 1: Tracing table for Question 2

BookUnits	BookRetailCost	BookTotalCost	Output
12	1188	950.4	BookTotalCost = 950.4
2	-	198	BookTotalCost = 198
25	2475	1485	BookTotalCost = 1485
5	495	396	BookTotalCost = 396
0	-	-	No book been purchased

### QUESTION 3

(8 MARKS)

Draw a flowchart to find the largest number among the three different numbers entered at one time by user. **Note:** You are not allowed to use logical operator (AND, OR, NOT).



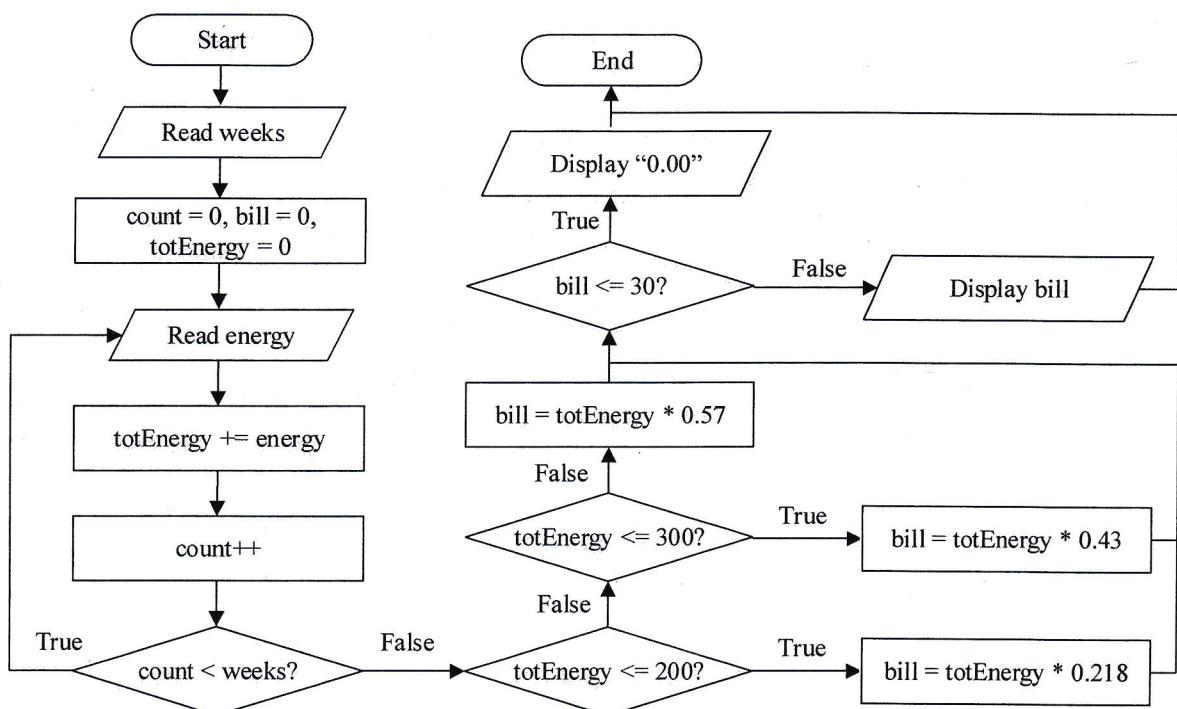
#### QUESTION 4

(8 MARKS)

Trace the value of the variables and determine the output of flowchart in **Figure 1** if the input for the *weeks* and *energy* (in kWh) are as follows:

- 4 weeks, the first week of energy used was 64 kWh and the energy consumed for 4 consecutive weeks increased by 10 kWh per week.
- 3 weeks, the energy consumed in first week is 7.5 kWh per day and it will be decreased 2 kWh per day in the following weeks.

Write your answers by completing **Table 2** and **Table 3**.



**Figure 1:** Flowchart for Question 4

**Table 2:** Tracing table for Question 4(a)

weeks	count	energy	totEnergy	bill	Output
4	0	-	0	0	
	1	64	64		
	2	74	138		
	3	84	222		
	4	94	316		?
	5			180.12	<del>bill = 180.12</del>
					180.12
					180.12
					180.12

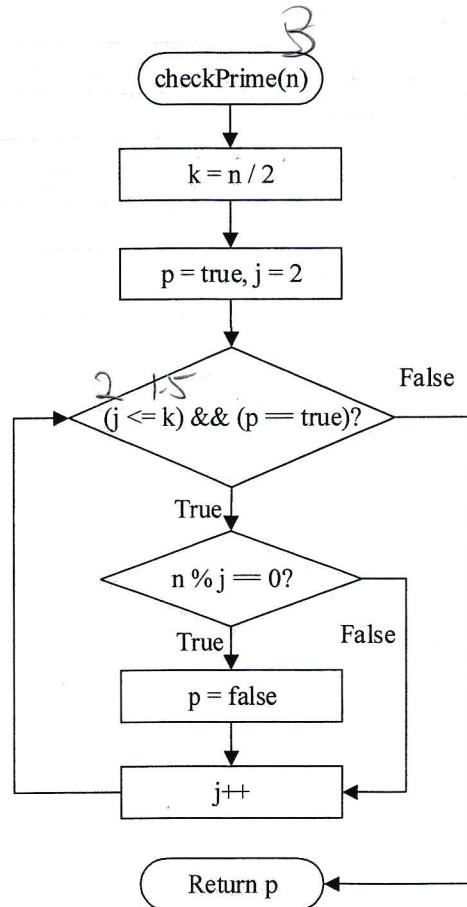
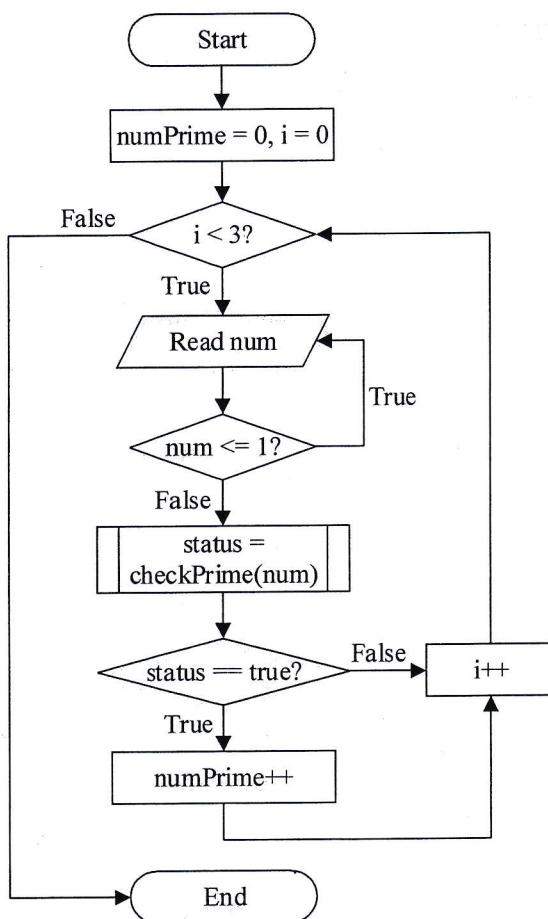
**Table 3:** Tracing table for Question 4(b)

weeks	count	energy	totEnergy	bill	Output
3	0	-	0	0	
	1	7.5	7.5		
	2	5.5	13.0		
	3	3.5	16.5		
	4			3.597	0.00
		0.75	0	0	0.75

**QUESTION 5**

(12 MARKS)

Flowchart in **Figure 2** with subroutine in **Figure 3** are used to check whether a number entered by the user is prime number or not. Then, it will calculate the number of prime numbers. Complete the tracing in **Table 4** if the input data is: 5, 3, 0, 6.



**Figure 2:** Main flowchart

**Figure 3:** Subroutine

**Table 4:** Tracing table for Question 5

		Variables							Conditions			
i	num	numPrime	status	n	k	p	j	i < 3	num <= 1	status == true	$j \leq k \&& (p == true)$	$n \% j == 0$
0	0							TRUE				
5	5			5	2.5	true	2	FALSE				
1	1			1	1	true	1	TRUE				
3	3			3	1.5	true	2	FALSE				
2	2			2	1.5	true	2	TRUE				
6	6			6	3	true	2	TRUE				
3	3			3	1.5	false	2	FALSE				

## QUESTION 6

(10 MARKS)

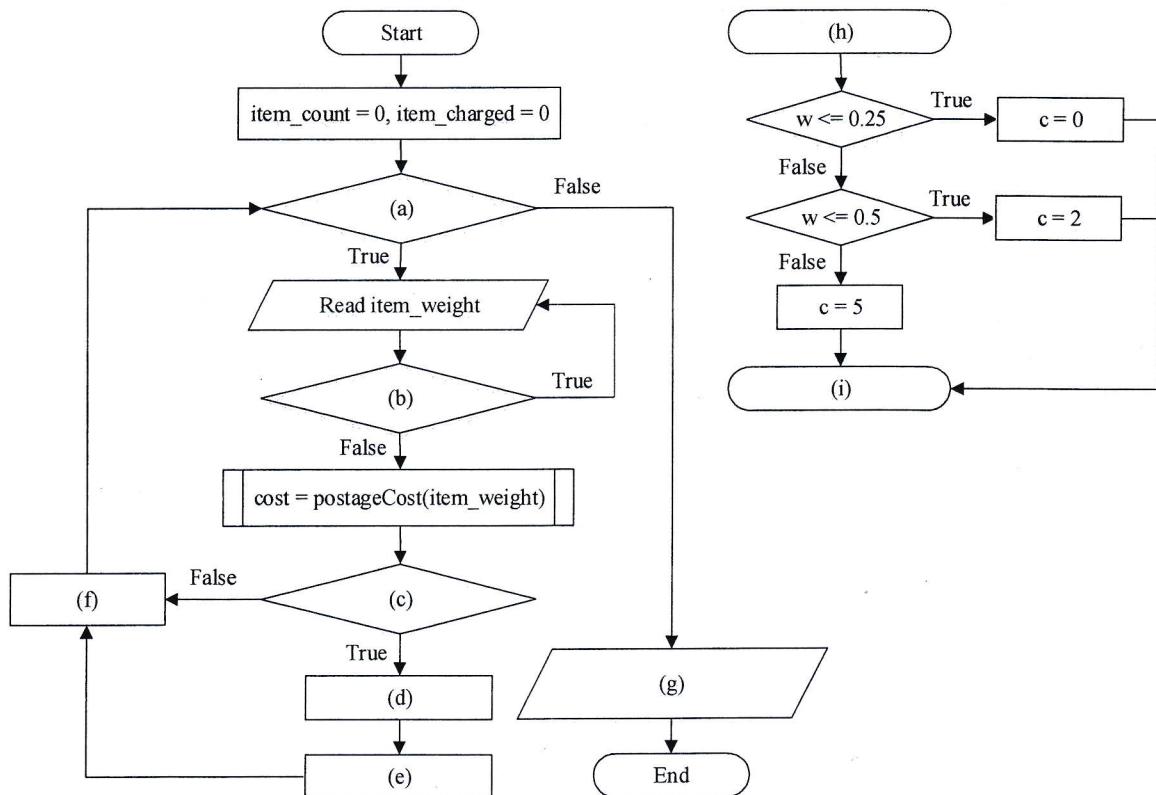
You are requested to write a program by the client to sum the total postage cost of five items. Below is the list of requirements given by the client.

- The program should able to detect if item's weight entered is valid. Item should not weigh more than 1 kg. Zero (0) or less value entry is considered as an invalid input of item weight.
- Use function named *postageCost()* to calculate postage cost to be charged to the item. Based on the item weight, item may not be charged thus, this function may return a zero (0) value of postage cost.
- The final output of the program is the total number of item being charged with postage cost and the sum of the overall postage cost.

Below is the description of identifiers use in the flow chart:

Identifiers	Descriptions
<i>item_count</i> ✓	Count the number of items being processed.
<i>item_weight</i> ✓	Weight of item entered by the user.
<i>cost</i>	Postage cost of item calculated by <i>postageCost(weight)</i> function.
<i>item_charged</i>	Total number of items being charged with postage cost.
<i>sum_cost</i>	Sum of overall cost for items being charged with postage cost.

Complete flowchart in **Figure 4** by filling the blanks labelled (a) to (i) with appropriate instruction/statement. Write your answers in **Table 5**.



**Figure 4:** Incomplete flowchart for Question 6

**Table 5:** Answer for Question 6

No	Instruction/ Statement
(a)	item_count < 5 ✓
(b)	item_weight > 1 or item_weight < 0 ✓
(c)	cost not equal to 0 ✓
(d)	item_charge++ ✓
(e)	sum_cost += cost ✓ (8)
(f)	item_count++ ✓
(g)	Display item_charge, cost, sum-cost ✓
(h)	postagecost(w) ✓
(i)	Return C ✓

**PART B: PROGRAMMING QUESTIONS****[50 MARKS]****QUESTION 1****(6 MARKS)**

The following program has syntax and/ or logical error(s). Find the error(s) as many as you can and write the correct program in the space provided.

```
1 include <iostream>
2 using namespace std;
3
4 int main
5 {
6     float double = 7.8;
7
8     /* Print a value of 'double'
9     return 0;
10
11    cout << "double = " << double
12    << endl;
13 }
```

**Answer:**

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

```
int main()
```

```
{
```

```
float d=7.8;
```

```
cout<<"d = "<<d
```

```
<< endl;
```

```
/* Print a value of 'd'
```

```
return 0;
```

```
}
```

16

Q

$$b = b + -c^* \mid a + = b$$

**QUESTION 2**

(6 MARKS)

Determine the output for the program segment given in **Table 6**. Write your output with two decimal points if applicable in **Output** column in **Table 6**.

**Table 6:** Program segment and output for Question 1

Line	Code	Output
1	int a = 10, b = 4, c, d;	
2	float x = 3.5, y; 10 3 1/4	
3	c = a++ % static_cast<int> (x) / 4; 34 85 10 -1	
4	d = x * a + --c; 14 84 4	
5	a /= d % b++ * x; // a = 11/14 % b++ * x 00 14 -1 4 35	
6	y = a * c + b / x; 1 11 35	
7	b += -c * static_cast<int> (++y); 1 1	
8	x = y-- * a - x; 11 35	
9		
10	cout << "a = " << a << endl;	a = 14
11	cout << "b = " << b << endl;	b = 5
12	cout << "c = " << c << endl;	c = -1
13	cout << "d = " << d << endl;	d = 34
14	cout << "x = " << x << endl;	x = 10.5
15	cout << "y = " << y << endl;	y = 0.0

**QUESTION 3**

(5 MARKS)

Write a code segment based on voting system as shown in **Table 7** using selection statement.

**Table 7:** Voting system

Age	Voting
0 - 17	Not allowed
18 - 65	Allowed without helper
66 - unlimited	Allowed with helper

The example of outputs for this code segment as shown in **Figure 5**.

<b>Run 1</b>	<b>Run 2</b>
Please enter your age: 16 You can't vote.	Please enter your age: 20 You can vote without helper
<b>Run 3</b>	<b>Run 4</b>
Please enter your age: 90 You can vote with helper	Please enter your age: 50 You can vote without helper

**Figure 5:** Example of outputs for 4 runs

**Answer:**

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

int main()
{
    int age;
    do
    {
        cout << "Please enter your age: ";
        cin >> age;
    } while (age < 0);
    if (age >= 0 && age <= 17) ✓
        cout << "You can't vote." << endl;
    else if (age >= 18 && age <= 65) ✓
        cout << "You can vote without helper\n";
    else
        cout << "You can vote with helper\n";
    return 0;
}
```

#### QUESTION 4

(6 MARKS)

Determine the output for the program segment given in **Table 8**. Write your output in **Output** column in **Table 8**. **Note:** ASCII value of 'A' = 65 and 'd' = 100.

**Table 8:** Program segment and output for Question 4

Line	Code	Output
1	int p = 65, q = 100;	
2	char x = 'A', y = 'd';	
3	bool m = false, n;	
4		
5	cout << ((x + 35) == q) << endl;	
6	cout << (!x    m) << endl;	
7	cout << (((m + x - 100) < (p + y)) && !m)	
8	<< endl;	
9	n = x + q;	
10	 q = y + n;	
11	y = static_cast <char> (y + 1);	
12		
13	cout << "n = " << n << endl;	n = 1
14	cout << "q = " << q << endl;	q = 101
15	cout << "y = " << y << endl;	y = B

#### QUESTION 5

(9 MARKS)

Trace the output of the following program segments:

2 <

a)

1	int i = 0, j = 1, k;	i = 0 ,
2		
3	while (i < 4)	
4	{	
5	(j > 1) ? j = j * 2 : j = j * 1;	
6	for (k = 0; k < j; k++)	
7	cout << j;	
8		
9	cout << endl;	
10	i++;	
11	}	

**Answer:**

1  
1  
22  
4444 / 4

b)

```
1 int i = 10, j;
2 while (i > 0)
3 {
4     for (j = 1; j < i; j*=5)
5     {
6         cout << i << " " << j << endl;
7         if (j > 5)
8             break;
9         else
10            continue;
11    }
12    i -= 3;
13 }
```

6/2

**Answer:**

10 1  
10 5  
10 25  
7 1  
7 5  
7 25  
4 1  
4 5  
4 25  
1 1  
1 5  
1 25

**QUESTION 6****(18 MARKS)**

You have a program to calculate the total price of fruits. The program will receive item id as a user input. **Table 9** shows the list of fruits. The process to calculate the total price will be repeated until the user enter invalid item id (refer Table 9). Finally, the program will display the total price of fruits. **Figure 6** shows example of output for the program.

**Table 9:** List of fruits

Item Id	Item Name	Cost per Unit
A	Apple	RM 2.00
O	Orange	RM 2.50
L	Lemon	RM 1.80

```
Enter the item id: A
Enter the quantity of item: 5

Enter the item id: O
Enter the quantity of item: 4

Enter the item id: L
Enter the quantity of item: 3

Enter the item id: K
The total price is: RM25.4
```

**Figure 6:** Example of outputs for Question 6

$$\begin{aligned}A &= 200 \\B &= 250 \\C &= 180\end{aligned}$$

Complete and write the code segment of **main()** function for the program using:

- a) Post-test loop and **if** statement

```
int main()
{
    char choice;
    int qty;
    float price, tot_Price = 0;

    do
    {
        cout << "Enter the item id: ";
        cin >> choice;      0.5

        if (choice == 'A')
        {
            cout << "Enter the quantity of item: ";
            cin >> qty; price = qty * 200;
        }
        else if (choice == 'O')
        {
            cout << "Enter the quantity of item: ";
            cin >> qty; price = qty * 280;
        }
        else if (choice == 'L')
        {
            cout << "Enter the quantity of item: ";
            cin >> qty; price = qty * 180;
        }
        else
            break; - . . .

        tot_Price += price;
    } while (choice != 'A' || choice != 'O' || choice != 'L');

    cout << "The total price is: " << tot_Price << endl;

    return 0;
}
```

A 2.00  
O 2.50

b) Pre-test loop and **switch** statement

L 1-8v

```
int main()
{
    char choice;
    int qty;
    float price, tot_Price = 0;
```

choice = 'A'.

```
while (choice == 'A' || choice == 'O' || choice == 'L')
{ cout << "Enter the item id: ";
```

cin >> choice;

switch (choice) {

case 'A': cout << "Enter the quantity of item: ";
 cin >> qty;

price = qty \* 2.00; tot\_Price += price;

case 'O': cout << "Enter the quantity of item: ";
 cin >> qty;

price = qty \* 2.50; tot\_Price += price;

case 'L': cout << "Enter the quantity of item: ";
 cin >> qty;

price = qty \* 1.80; tot\_Price += price;

continue;

default: break;

}

cout << "The total price is: " << tot\_Price << endl;

```
} return 0;
```

Q.S  
/\

B