



UNIVERSITI TEKNOLOGI MALAYSIA

TEST 1

SEMESTER I 2015/2016

SUBJECT CODE : SCSJ1013
SUBJECT NAME : PROGRAMMING TECHNIQUE I
YEAR/COURSE : 1 (SCSJ / SCSV / SCSB / SCSR)
TIME : 2 HOURS AND 30 MINUTES
DATE : 27 OCTOBER 2015
VENUE : N28 MPK1-MPK9

INSTRUCTIONS TO THE STUDENTS:

This test book consists of 3 parts:

PART A : Basics of C++ [marks]

PART B : Selection Structure [marks]

PART C : Loop Structure [marks]

TOTAL [marks]

ANSWER ALL QUESTIONS IN THIS BOOKLET IN THE SPACES PROVIDED.

Name	
I/C No.	
Year/Course	
Section	
Lecturer's Name	

This question booklet consists of 15 pages including the cover page.

PART A : Basics of C++**[marks]**

1. There are five operators show in the below figure. Label the order of execution for each operator in the boxes as stated in the following expression. Those operators will execute first should be labeled as 1, the second operator execution should be labeled as 2, the third operator execution should be labeled as 3 and so on.

(9 marks)

z	=	(	12	+	4	)	/	4	+	30	/	3	-	3

Solution:

z	=	(	12	+	4	)	/	4	+	30	/	3	-	3
				1			2		4		3		5	

Answer = 11

2. What is the output of **Program A.1** given below?

(9 marks)

```

1  // Program A.1
2  #include <iostream>
3  #include <iomanip>
4  using namespace std;
5
6  int main( )
7  {   double   val = 10.345;
8
9      cout<<setprecision(5)<< val <<endl;    (a)
10     cout<<setprecision(4)<< val <<endl;    (b)
11     cout<<setprecision(3)<< val <<endl;    (c)
12     cout<<setprecision(2)<< val <<endl;    (d)
13     cout<<setprecision(1)<< val <<endl;    (e)
14
15     cout<< "Apa Khabar \n Semua /n " <<endl;    (f)
16     cout<< static_cast<int>(val)/2 <<endl;    (g)
17     cout<< setw(6)<< val*5 <<endl;    (h)
18     cout<< showpoint <<fixed <<setw(8)<<val <<endl; (i)
19
20     return 0;
21 }
```

--	--

Output:

(a)	10.345
(b)	10.35
(c)	10.3
(d)	10
(e)	1e+001
(f)	Apa Khabar Semua /n
(g)	5
(h)	51.725
(i)	10.345000

```

C:\K:\Pengajaran\20152016-sem1\TP1\TestCode\te
Apa Khabar
Semua /n
5
51.725
10.345000
-----
Press any key to continue . . . _

```

3. Based on the code **Program A.2** below and the given desired output, if the input string entered is "ABCDEFGH HIJKL" to display the desired output, write the corresponding **cin** and **cout** statement.

(7 marks)

```

1 // Program A.2
2 #include <iostream>
3 #include <iomanip>
4 using namespace std;
5
6 int main( )
7 {
8     char    x[13];
9     cout<<" Enter a string : ";
10     .....
11     .. complete the code to get..
12     .. the desired output
13     ...for Code 1; Code 2; Code 3
14     .....
15 return 0;
16 }

```

Code 1: [2 marks]

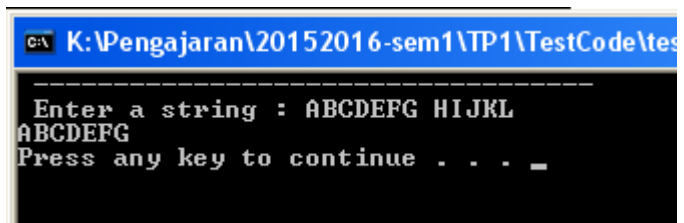
```
cin>>x;
cout<<x<<endl;
```

Output:

[illegible]

Solution:

A	B	C	D	E	F	G						
---	---	---	---	---	---	---	--	--	--	--	--	--



Code 2: [2 marks]

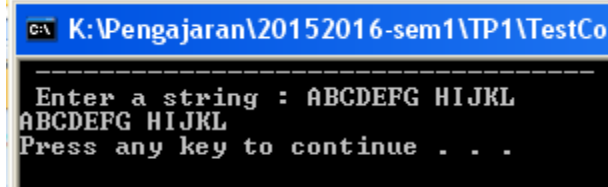
```
cin.getline(x,13);
cout<<x<<endl;
```

Output:

[illegible]

Solution:

A	B	C	D	E	F	G		H	I	J	K	L
---	---	---	---	---	---	---	--	---	---	---	---	---

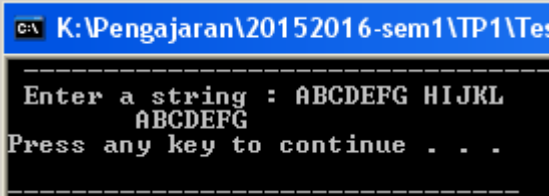


Code 3: [3 marks]

```
cin>>x;
cout<<setw(13)<<x<<endl;
```

Output:

[illegible]

	Solution:													
	<table border="1"> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td><td>G</td> </tr> </table>							A	B	C	D	E	F	G
							A	B	C	D	E	F	G	
														

4. The following C++ program, **Program A.3** will not compile until the lines rearrange in the correct order. (11 marks)

1	// Program A.3
2	cout << "Success\n";
3	cout << " Success\n\n";
4	int main()
5	cout << "Success"; }
6	using namespace std;
7	// Program ABC
8	#include <iostream>
9	cout << "Success\n";
10	{
11	return 0;

Program output :

1. Success
2. Success
- 3.
4. Success Success

Use the table below to rearrange the lines based on the output given.

Solution:

1	<code>// Program ABC (1)</code>
2	<code>#include <iostream> (1)</code>
3	<code>using namespace std; (1)</code>
4	<code>int main() (1)</code>
5	<code>{ (1)</code>
6	<code>cout << "Success\n"; (1)</code>
7	<code>cout << "Success\n\n"; (1)</code>
8	<code>cout << "Success"; (1)</code>
9	<code>cout << "Success\n"; (1)</code>
10	<code>return 0; (1)</code>
11	<code>} (1)</code>

PART B : Selection Structure**[marks]**

1. Write the corresponding conditional expression for the following if else statements.

(10 marks)

	If else statement	Conditional expression
i.	<pre>if (x<y) q = 0; else q = 1;</pre>	<pre>q = (x<y)? 0 : 1; or (x<y)? q=0;q=1;</pre>
ii.	<pre>if (x<y) q = a + b; else q = x * 2;</pre>	<pre>q = (x<y)? a+b : x*2; or (x<y)? q=a+b;q=x*2;</pre>
iii.	<pre>if (x<y) q = x * 2; else q = a * b;</pre>	<pre>q = (x<y)? x*2 : a*b; or (x<y)? q=x*2;q=a*b;</pre>
iv.	<pre>if (x == y) q = 1; else q = 0;</pre>	<pre>q = (x==y)? 1 : 0; or (x==y)? q=1;q=0;</pre>

2. Write the if statement code fragment to satisfy the given condition.

(10 marks)

i.	Check the range of frequency, <i>freq</i> to be between 100Hz and 10000Hz. Display “Acceptable” if within the range and “Unacceptable” if not.
	<pre> if ((freq >=100) && (freq <=10000)) cout<<"Acceptable"<<endl; else cout<<"Unacceptable"<<endl; </pre> (3 marks)
ii.	Check the condition of a soldier candidate to be of <i>age</i> between 18 to 30 years, <i>weight</i> must be between 50 to 65kg and <i>height</i> must be greater than 156m. Display Pass or Fail based on the condition.
	<pre> if ((age >=18)&&(age <=30)&&(weight >= 50)&& (weight<=65)) cout<<"Pass"<<endl; else cout<<"Fail"<<endl; </pre> (3 marks)
iii.	Hendry wants to buy a car with these condition i. The <i>year</i> made : after 2010, cylinder capability, <i>cc</i> between 1.5 to 2.0. or ii. The <i>year</i> made: before 2010 , cylinder capability, <i>cc</i> greater than 2.0. display buy or not buy necessarily in the code.
	<pre> if year >=2010) { if ((cc >=1.5) && (cc <=2.0) cout<<"Buy"<<endl; else cout<<"Not Buy"<<endl; } else { if ((cc > 2.0) } cout<<"Unacceptable"<<endl; </pre> (4 marks)

3. Based on the code except, identify whether the program can execute. If you identify the code will produce error, give one sentence to explain the error. The first question has been done for an example.

(24 marks)

Code	Can the program execute		Output	Error Description
	Yes	No		
Example: <code>x=1</code> <code>cout<<x;</code>		✓	-	x=1 has no semicolon
<code>int age=55;</code> <code>if (age >= 65);</code> <code>cout << "Age is greater than or</code> <code>equal to 65" << endl;</code>	✓		Age is greater than 65	
<code>int x=8, total=0;</code> <code>while (total <= 10)</code> <code>total += x;</code> <code>x++;</code> <code>cout<<x;</code>	✓		9	
<code>int x;</code> <code>for (x = 3, x >= 1, x--)</code> <code>cout << x << endl;</code>		✓		The statement in for loop should have a semicolon
<code>int grade = 95;</code> <code>if (grade>90)</code> <code>cout<<"Excellent"<<endl;</code> <code>else;</code> <code>cout<<"Good"<<endl;</code>	✓		Excellent Good	
<code>int test = 1;</code> <code>switch (value % 2)</code> { <code>case 0: cout << "Even integer" <<</code> <code>endl;</code> <code>case test: cout << "Odd integer" <<</code> <code>endl;</code> }		✓		Case –value cannot be a variable
<code>counter = 2;</code> <code>do</code> { <code>cout << counter << endl;</code> <code>counter += 2; }</code> <code>While (counter < 100);</code>		✓		

<pre>int n=4; if (!n%2) cout<<"this is true"; else cout<<"this is false";</pre>	✓		This is false	
<pre>int MyNumber = 1; int count; for (count =1; count<=(MyNumber + 1); count++) cout<<count<<" "<<MyNumber<<endl;</pre>	✓		1 1 2 1	

4. What is the output for the following code excerpt?

(10 marks)

Code	Output
<pre>int i=10, j=3,k = 20; cout<<((j < 4) (j == 5) && (i <= k));</pre>	1
<pre>int x = 25; if (x >= 12) cout<<"Mid"; cout<<"Term";</pre>	MidTerm
<pre>int x = 25; if (x / 2 == 12){ cout<<"Mid"; cout<<"Term"; }else { cout<<"TP1"; cout<<"C++"; }</pre>	MidTerm
<pre>int n =0; if (n=0) cout<<"Yes"; else cout<<"No"; }</pre>	No
<pre>int x=3, y=9; if (x >= y) if (y > 0) x = x * y; else if (y < 4) x = x - y; cout<<x;</pre>	3

5. Given the following declaration, identify the output for the statements

(10 marks)

Boolean expression	Output
<pre>const int MAXSCORE = 100; char MI = 'L', MI2 = 'g'; int Quiz1 = 18, Quiz2 = 6; int Score1 = 76, Score2 = 87; string Name1 = "Fred", Name2 = "Frodo";</pre>	
cout<<(Quiz1 == Quiz2)<<endl;	0
cout<<(Score1 >= Score2) <<endl;	0
cout<<(Score1 > MAXSCORE) <<endl;	0
cout<<((Score1 + Quiz1) <= (Score2 + Quiz2))<<endl;	0
cout<<(MI == MI2) <<endl;	0
cout<<(MI < MI2) <<endl;	1
cout<<('Z' < 'a') <<endl;	1
cout<<(Name1 < Name2) <<endl;	1
cout<<!(Score1 > Score2)<<endl;	1
cout<<!(Name1 < Name2) <<endl;	0

PART C : Loop Structure**[marks]**

1. Read the instruction below.

(30 marks)

(a)

C

omplete the portion of program in order to display the output as shown below and show your work in the space given.

(8 marks)

```
int x= ____ (a) ____;
do {
    x--;
    if (x % ____ (b) ____ == ____ (c) ____ ) continue;
    cout << x << ", ";
} while (x >= ____ (d) ____);
```

Output

14, 12, 10, 8, 6, 4, 2, 0, -1, -2,

space to show your work

Answer

(a)

(b)

(c)	_____
(d)	_____

Answer	
(a)	_____
	_____ 16 _____
(b)	_____
	_____ 2 _____
(c)	_____
	_____ 1 _____
(d)	_____
	_____ -1 _____
setiap satu jawapan = 1 markah (4 markah) dan jalan kerja dpt 4 markah utk setiap satu jawapan, so, total adaalah 8 markah keseluruhan kerana kesusahan nak tentukan nilai2 tersebut. * asalkan ada conteng2 di situ bagi je markah.	

- (b) A
 ccording to the portion of program above, if x = 4, display the output. (4 marks)

2, 0, -1, -2,

*each answer = 4 marks

- (c) T
 he table shows the portion of program using loop instruction. Rearrange this program in order to display the output as shown below. (12 marks)

1	} while (y>1);
---	----------------

2	<code>cout << y << ", ";</code>
3	<code> y *= 2;</code>
4	<code>do {</code>
5	<code>if (y > 1024) break;</code>
6	<code>int y=2;</code>
	Output 2, 4, 8, 16, 32, 64, X, X, 512, 1024,
	Write your answer here : 1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ Solution: Skema markah : <pre> int y=2; do { if (y > 1024) break; cout << y << ", "; y *= 2; } while (y>1); </pre> *setiap baris, markahnya adalah 2 maka total adalah 12 markah mengikut tahap kompleksitinya

--	--

(d)

W

What is the value of X and Y ?

(2 marks)

X= 128 (1m)

Y = 256 (1m)

(e)

A

200, 400, 800,

* ANSWER MUST IN THIS FORM

each answer 1 mark so total = 3 marks.

The arrangement of data = 1 mark

Total = 4 marks

According to the portion of program above, if y = 200, display the output.

(4 marks)

2. Determine the output of each code segment below.

(20 marks)

(a).

```
int x=16;
do {
    x--;
    if (x % 2 == 1) continue;
    cout << x << ", ";
} while (x >= -1);
```

Output

14, 12, 10, 8, 6, 4, 2, 0, -1, -2,

*setiap satu jawaban = satu markah (10 markah)

--

(b)

```
int y=2;
do {
    if (y > 1024 ) break;
    cout << y << ", ";
    y *= 2;
} while (y>1);
```

Output

2, 4, 8, 16, 32, 64, 128, 256, 512, 1024,
 *setiap satu jawaban = satu markah (10 markah)

3.

T

The factorial of a number n is the product of all number from 1 up to the number n . Using the **for** statement, write a code segment that prints the factorial of an integer number. The factorial of an integer number n is shown in the mathematical form below.

$$n! = \prod_{k=1}^n k$$

For example the factorial of number 5 is

$$5! = 5 * 4 * 3 * 2 * 1 = 120$$

The expected output :

Enter Number To Find Its Factorial : 5

$$5*4*3*2*1=120$$

This is factorial for 5

(13 marks)

Note: Complete your answer here.

1	<code>int num, factorial=1;</code>
---	------------------------------------

2	<code>cout << "Enter Number To Find Its Factorial : ";</code>
3	<code>cin >> num;</code>
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	

Solution:

1	<code>int num, factorial=1;</code>
2	<code>cout<<" Enter Number To Find Its Factorial: ";</code>
3	<code>cin>>num;</code>
4	<code>for(int a=num;a>=1;a--) (2M)</code>
5	<code>{ (1M)</code>
6	<code>factorial=factorial*a; (2M)</code>
7	<code>cout << a; (1M)</code>
8	<code>if (a == 1) (1M) continue; (1M)</code>
9	<code>cout << "*"; (1M)</code>
10	<code>} (1M)</code>
11	<code>cout<<"="<<factorial (1M) << endl; (1M)</code>
12	<code>cout<< "Ths is factorial for " << num << endl; (1M)</code>

4.

U

sing the **while** statement, write a code segment to print the **n**-th number in the Fibonacci series. The Fibonacci series of numbers are (26 marks)

0, 1, 1, 2, 3, 5, 8, 13, 21,

By definition, the first two numbers in the Fibonacci sequence are either 1 and 1, or 0 and 1, depending on the chosen starting point of the sequence, and each subsequent number is the sum of the previous two. The value of the first two numbers should be obtained from the user input. Assume, $n = 6$, so to generate 6-th number in the Fibonacci series when the first number is 4 and the second number is 6 :

4, 6, 10, 16, 26, 42

The expected output :

```
Enter the number of series you want :
6
Enter the first number you want :
4
Enter the second number you want :
6

This is first 6 terms of Fibonacci series are :-
4
6
10
16
26
42
```

This is portion of program :

```
1  int n, c, first, second, next;
2
3  cout << "Enter the number of series you want" << endl;
4  cin >> (a);
5  cout << "Enter the first number you want : " << endl;
6  cin >> (b);
7  cout << "Enter the second number you want : " << endl;
8  cin >> (c);
9
10 cout << "First " << (d) << " terms of Fibonacci series are :- "
11 << endl;
```

```

12
13  (e) =0;
14  while (c<n)
15  {
16      if ( (f) == 0 )
17          (g) = first;
18      else if ( (h) == 1)
19          next = (i);
20      else
21          {
22              next = (j) + second;
23              first = (k);
24              (l) = next;
25          }
26      cout << (m) << endl;
27      (n) ++;
28  }

```

Complete your answer here :

a.	n
b.	first
c.	second
d.	n
e.	c
f.	c
g.	next
h.	c
i.	second
j.	first
k.	second

l.	second
m.	next
n.	c

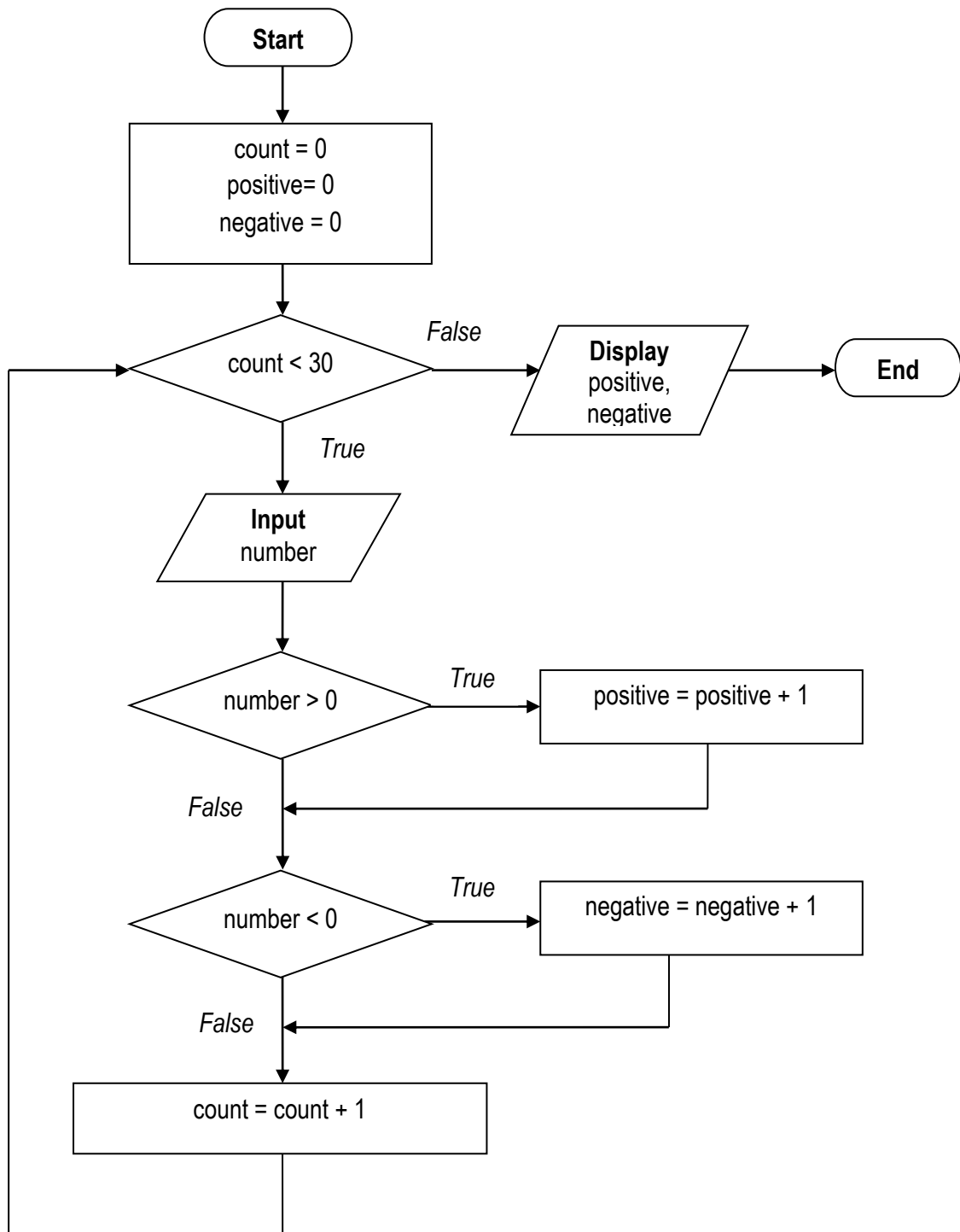
setiap satu 2 markah

Skema

```

1  int n, c, first, second, next;
2
3  cout << "Enter the number of terms of Fibonacci series you want" <<
4  endl;
5  cin >> n;
6  cout << "Enter the first number you want : " << endl;
7  cin >> first;
8  cout << "Enter the second number you want : " << endl;
9  cin >> second;
10
11 cout << "First " << n << " terms of Fibonacci series are :- " <<
12 endl;
13
14 c=0;
15 while (c<n)
16 {
17     if ( c == 0 )
18         next = first;
19     else if (c == 1)
20         next = second;
21     else
22     {
23         next = first + second;
24         first = second;
25         second = next;
26     }
27     cout << next << endl;
28     c++;
29 }
```

5. **The Flowchart 1** presents an algorithm of a program that counts the number of positive and negative numbers entered by the user. The user will enter 30 numbers. Translate the flowchart into its corresponding C++ program using an appropriate loop statement. Write your answer by completing the **Program C.1** and show your output. (10 marks)

**Flowchart 1**

Solution:

```
// Program C.1
#include <iostream>
using namespace std;

int main()
{
    int count = 0;           // The total count of numbers entered
    int positive = 0;        // The count of positive numbers
    int negative = 0;        // The count of negative numbers
    int number;              // The number entered

    while (count<30) (1M)
    { (1M)
        cout << "Enter Number : " ; (1M)
        cin >> number; (1M)

        if (number > 0) positive++; (1M)
        else if (number < 0) negative++; (1M)

        count++; (1M)
    } (1M)

    cout << "The positive number entered is " << positive << endl;
    (1M)
    cout << "The negative number entered is " << negative << endl;
    (1M)

    return 0;
}
```

6. a) Based on the flowchart in **Figure 1.0**. Answer question i-iii.

(10 marks)

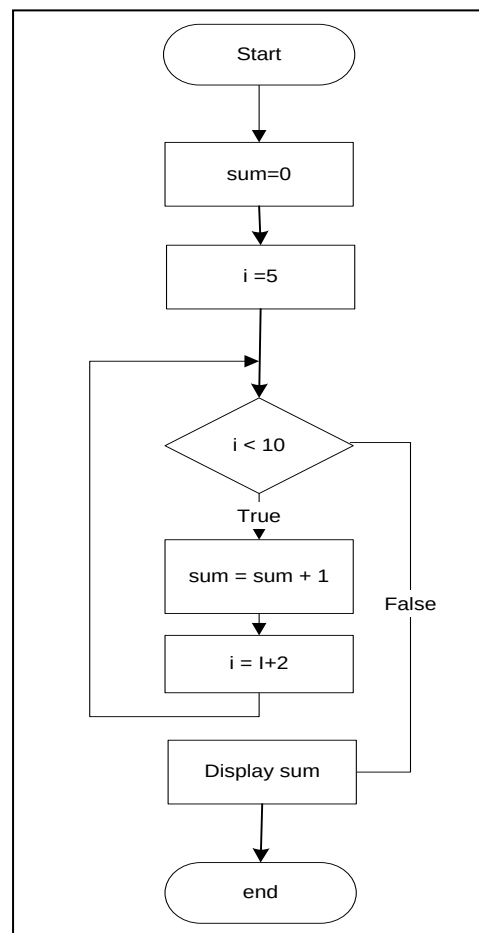


Figure 1.0

i. Convert the flowchart into an equivalent c++ code excerpt

[4 marks]

```
sum = 0;
i=5
while (i < 10)
{
    sum = sum+1
    i = i+2;
}
cout<<sum;
```

ii. How many times the loop repeat.

[2 marks]

3 times

iii. Modify your code by using decrement counter loop without changing the variables involved and the number of loops involved

[4 marks]

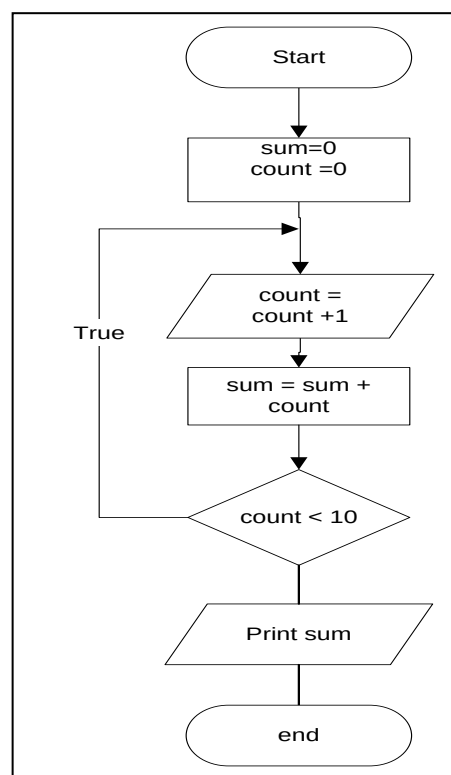
```

sum = 0;
i=10;
while (i > 5)
{
    sum = sum+1
    i = i-2;
}

```

6. b) Based on the flowchart in **Figure 2.0**. Answer question i-iii.

(10 marks)



- i. Convert the flowchart into an equivalent c++ code excerpt [4 marks]

```

int sum = 0, count = 0;
do{
    count = count+1;
    sum = sum+count;
}
while (count <10)
cout <<sum;

```

- ii. How many times
the loop repeats

[2 marks]

9 times

- iii. Modify the code if a decrement counter is used without changing the variables and the number of loops involved [4marks]

```
int sum = 0, count = 20;
do{
    count = count-1;
    sum = sum+count;
}
while (count >10)
cout <<sum;
```

7. The following programs can count the numbers of input character of A, B and C. The program will loop reading the input until sentinel value e is being input. The example output of the program is as shown:

```
Enter the letter grades[Enter 'e' character to end input]
A
Enter the letter grades[Enter 'e' character to end input]
B
Enter the letter grades[Enter 'e' character to end input]
C
Enter the letter grades[Enter 'e' character to end input]
C
Enter the letter grades[Enter 'e' character to end input]
C
Enter the letter grades[Enter 'e' character to end input]
e

Totals for each letter grade are:
A: 1
B: 1
C: 3
Press any key to continue . . .
```

Complete **Program C.1** based on the comments given

```

1  //Program C.1
2  #include <iostream>
3  using namespace std;
4  int main()
5  {
6      char grade; // one grade
7      int aCount = 0; // number of characterAs
8      int bCount = 0; // number of Bs
9      int cCount = 0; // number of Cs
10
11  cout << "Enter the letter grades[Enter 'e' character to end
12  input]"<< endl;
13  cin>>grade;
14
15  // write while loop with condition input not equals to 'e'
16  _____ { [2 marks]
17
18  //write switch statement for grade
19  _____: { [2 marks]
20
21  //case for grade A, increment the variable aCount
22  _____ [3 marks]
23  _____:
24  _____
25  _____
26
27  //case for grade B, increment the variable bCount
28  _____ [3 marks]
29  _____:
30  _____
31  _____
32
33  //case for grade C, increment the variable cCount
34  _____ [3 marks]
35  _____:
36  _____
37  _____
38
39  // add default statement to catch all other alphabets and
40  prints "Incorrect letter grade entered [3 marks]
41  _____:
42  _____
43  _____
44  _____
45
46  } // end switch
47  //ask for another input letter grades [2 marks]
48  _____
49  _____
50  _____
51
    } // end while

    // output summary of results [2 marks ]

```

	_____ // display number of A grades
	_____ // display number of B grades
	_____ // display number of C grades

	system("PAUSE");
	return 0;
	} // end function main

Solution:

1	//program A.1	
2	using namespace std;	
3	int main()	
4	{	
5	char grade; // one grade	
6	int aCount = 0; // number of characterAs	
7	int bCount = 0; // number of Bs	
8	int cCount = 0; // number of Cs	
9	cout << "Enter the letter grades[Enter 'e' character to end input]"<< endl;	
10	cin>>grade;	
11		
12	// loop until user types char e	
13	while (grade!= 'e') {	[2 marks]
14		
15	//use switch to identify the character	
16	switch (grade) {	[2 marks]
17		
18	//case for grade A, increment the variable aCount	[3 marks]
19	case 'A':	
20	++aCount;	
21	break;	
22		
23	//case for grade B, increment the variable aCount	[3 marks]
24	case 'B':	
25	++bCount;	
26	break;	
27		
28	//case for grade C, increment the variable aCount	[3 marks]
29	case 'C':	
30	++cCount;	
31	break;	
32		
33	// add default statement to catch all other alphabets and prints "Incorrect letter grade entered"	
34		[3 marks]
35	default:	
36	cout << "Incorrect letter grade entered."<< endl;	
37	break; // optional; will exit switch anyway	
38		
39	} // end switch	
40	//ask for another input letter grades	[2 marks]

```

41  cout << "Enter the letter grades[Enter 'e' character to end input]"<< endl;
42  cin>>grade;
43  } // end while
44      // output summary of results [2 marks ]
45      cout << "\n\nTotals for each letter grade are:"
46      << "\nA: " << aCount // display number of A grades
47      << "\nB: " << bCount // display number of B grades
48      << "\nC: " << cCount // display number of C grades
49      << endl;
50
51      system("PAUSE");
      return 0; // indicate successful termination
    } // end function main

```

8. Complete this program based on the instruction

Solution:

```

//Includes suitable library
#include <iostream>
#include <iomanip>

using namespace std;

#define LOW 32
#define HIGH 212
#define EXIT -99

int main()
{
    int userVal, betweenCnt = 0, extremeCnt = 0, sum = 0;
    double avg;

    cout << "Enter a number (" << -99 << " to quit):";
    cin >> userVal;

    //while the user has not entered the exit value
    //if the user's value is between LOW and HIGH, then increment the
    extremeCnt values.
    //Otherwise, add the user's value to variable sum and increment the count
    //of variable betweenCnt
    //get the next number from the user

    while( userVal != -99 )
    {
        if( userVal < LOW || userVal > HIGH )
            extremeCnt++;

        else
        {
            sum += userVal;
            betweenCnt++;
        }
    }
}

```

```
    }

    cout << "Enter a number (" << EXIT << " to quit):";
    cin >> userVal;
}

//If the user entered at least 1 valid number, calculate the average
//and then display it and the number of extreme values that were
//entered.

if ( betweenCnt > 0 )
{
    avg = (double) sum / betweenCnt;

    cout << endl << endl << "Average is: "
        << setiosflags(ios::fixed) << setprecision(2) << avg
        << endl << "There were " << extremeCnt << " extreme values";
}

return 0;
}
```