CONFIDENTIAL

UTM UNIVERSITI TEKNOLOGI MALAYSIA

SCHOOL OF COMPUTING
Faculty of Engineering

UNIVERSITI TEKNOLOGI MALAYSIA
FINAL EXAMINATION SEMESTER I, 2018 / 2019

SUBJECT CODE	**: SCSJ 1013**
SUBJECT NAME	**: PROGRAMMING TECHNIQUE I (PAPER I)**
YEAR/COURSE	**: 1 (SCSJ / SCSV / SCSB / SCSR /SCSP)**
TIME	**: 1 HOUR AND 30 MINUTES**
DATE/DAY	**: 2nd JANUARY 2019 (WEDNESDAY)**
VENUE	**: DEWAN SULTAN ISKANDAR (DSI)**

INSTRUCTIONS :

This test book consists of 8 questions.

Please answer all questions in the answer booklet.

ANSWER ALL QUESTIONS IN THIS BOOKLET IN THE SPACES PROVIDED.

Name	
Matric No.	
Year/Course	
Section	
Lecturer's Name	

This question booklet consists of **12 pages** inclusive of the cover page.

QUESTION 1 **[6 MARKS]**

The code segment below is meant to print the element of arrays and has four syntax and/or logical errors. Identify which line and describe each of the errors.

Line	C++ Statement
1	`int numbers[10] = {1,4, ,6, ,8};`
2	`int table[10];`
3	`char greeting[] = 'H','e','l','l','o';`
4	
5	`for (int x = 0; x < 15; x++)`
6	`{`
7	`cout << "Enter the next value: ";`
8	`cin >> table [x];`
9	`}`
10	`numbers[] = table [];`
11	
12	`for (int x = 0; x < 10; x++)`
13	`cout << numbers[x] << endl;`

Answer:

QUESTION 2 **[8 MARKS]**

Write the output of the code segment below.

```
float number = 150.50, number2=85.50;
float * pNumber;
pNumber = &number;  // address of number is 0x2c

cout << pNumber  << endl;  0x2c
cout << &number  << endl;  0x2c
cout << *pNumber << endl;  150.50
cout << number   << endl;  150.50

*pNumber = *pNumber + 90.50;
cout << ++*pNumber << endl;  242
cout << --number   << endl;  241

pNumber = &number2;
number=*pNumber + 20.20;
cout << *pNumber  << endl;  85.5
cout << number    << endl;  105.7
```

Answer:

QUESTION 3 **[10 MARKS]**

Write the output of the code segment below.

```
1   const int ROW = 5, COL = 2;
2   int i, j, arr[ROW][COL];
3   int sum[ROW] = {0, 0, 0, 0, 0};
4
5   for (i = 0; i < ROW; i++)
6   {
7         for (j = 0; j < COL; j++)
8         {
9               arr[i][j] = pow(COL, i) + j;
10              sum[i] += arr[i][j];
11        }
12        cout << sum[i] << endl;
13  }
14
15  for (i = 0; i < ROW; i++)
16        cout << sum[i] - arr[i][COL-1] << endl;
17
```

Answer:

QUESTION 4 **[10 MARKS]**

Program 1 below is meant to ask the user to enter a diameter of circle, and display the radius and area of the circle. The program uses a function to return a structure. The area of the circle is expressed by the formula $A = \pi r^2$, and the radius of the circle is expressed by the formula *radius = diameter/2.* In function `calculateRadius`, user enters the diameter of the circle and then calculates the radius.

Complete **Program 1**, based on the instructions or comments written in (a) to (g).

Line	Program 1
1	`#include <iostream>`
2	`#include <cmath>`
3	`using namespace std;`
4	
5	`const struct double PI = 3.14159;`
6	
7	`struct Circle`
8	`{`
9	`   double radius;`
10	`   double diameter;`
11	`   double area;`
12	`};`
13	
14	`// (a) Write function prototype for calculating radius.`
15	`   _____;`
16	
17	`int main(){`
18	`// (b) Declare a structure variable for circle`
19	`   _____;`
20	
21	`   c = calculateRadius();`
22	
23	`// (c) Write statement to calculate the circle's area using`
24	`//     suitable predefined function.`
25	
26	`   _____;`

```
27  // (d) Write statement to display the circle data.
28    ____________________________________________;
29    ____________________________________________;
30     return 0;
31     } // end of main function
32
33  // Function to calculate radius
34     Circle calculateRadius()
35     {
36  //(e) Declare a temporary structure variable for circle.
37
38     ____________________________________________;
38  //(f) Write statement to get input for diameter of circle.
40     cout << "Enter the diameter of circle: ";
41
42     ____________________________________________;
43  //(g) Write statement to calculate radius of circle.
44
45     ____________________________________________;
46     return tempCircle;
47
48     } // end of calculateRadius function
```

QUESTION 5 **[8 MARKS]**

Program 2 is intended to read the data from the input file ("***input.txt***") and to display the data on the screen. The data in the input file is shown in **Figure 1**. Fill in the blank with appropriate C++ statements.

```
2  10  14  88  77  20  101  -1  40  -57
```

Figure 1: Input file

Line	Program 2
1	`#include <iostream>`
2	`_____ //Include suitable library for file`
3	`//operations`
4	`using namespace std;`
5	
6	`int main()`
7	`{`
8	`int i, num;`
9	`fstream inDat;`
10	
11	`//Open the input file named "input.txt"`
12	`_____;`
13	`//Test for successful opening file`
14	`_____;`
15	`{`
16	`cout << "ERROR cannot open the file!" << endl;`
17	`return 0;`
18	`}`
19	`cout <<"The numbers are : \n";`
20	`for (i = 1; i <= 10; i++)`
21	`{`
22	`//Read the numbers from the input file`
23	`_____;`
24	
25	`//Display the numbers on the screen`
26	`_____;`
27	`}`
28	`cout << "Exit from the program";`
29	
30	`//Close the input file`
31	`_____;`
32	`return 0;`
33	`}`
34	

QUESTION 6 **[10 MARKS]**

a. Given the following program (**Program 3**) in **Table 2**. Show the values of **`ptr`** and **`temp`** variables, as well as values stored in **`Arr`** array in the blank boxes in **Figure 2**. The first **`Arr`** array in **Figure 2** is when the program is executed until Line 11, while the second **`Arr`** array in **Figure 2** is when the program is executed until Line 18. (7 marks)

Table 2

Program 3		**Output**
1	`#include <iostream>`	
2	`using namespace std;`	
3		
4	`int main()`	
5	`{`	
6	`  int Arr[] = {25, 30, 45, 70};`	
7	`  int *ptr = &Arr[0], *temp;`	
8		
9	`  temp = ptr + 2;`	
10	`  *temp = *++ptr;`	
11	`  *ptr = *Arr+2;`	
12	`  Arr[3] = *(ptr+1) + 5;`	
13	`  *Arr += 3;`	
14		
15	`  cout << _____ << endl;`	**0x72fe20**
16	`  cout << _____ << endl;`	**0x72fe34**
17	`  cout << _____ << endl;`	**30**
18	`  return 0;`	
19	`}`	

Answer:

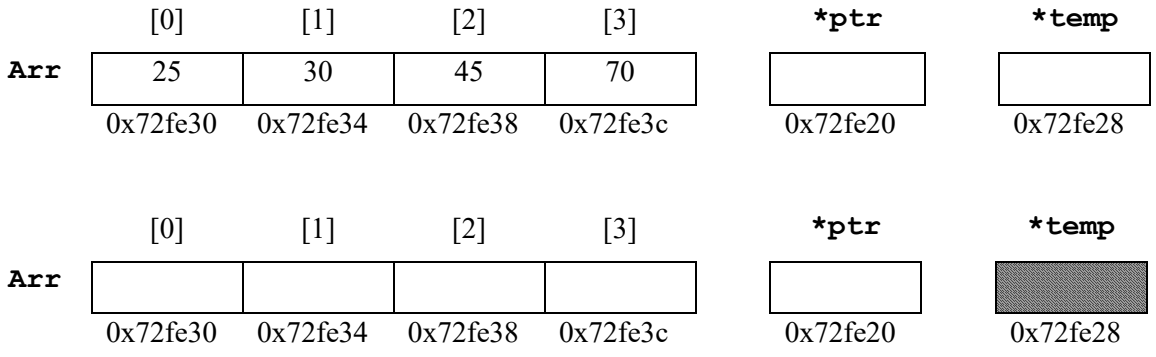

Figure 2

b. Based on output given of **Program 3 i**n **Table 2**, complete the C++ statements in line 15 to 17. ***Note:*** You should only use **`ptr`** variable to answer this question. Write your answers in **Table 3**. (3 marks)

Answer:

Table 3

Line	C++ statements
15	`cout << _____ << endl;`
16	`cout << _____ << endl;`
17	`cout << _____ << endl;`

QUESTION 7 **[8 MARKS]**

a. Based on the **Program 4**, demonstrate the outputs in **Table 4**. ***Note:*** one cell represents one space per digit or character. (4 marks)

Line	Program 4
1	`#include <iostream>`
2	`#include <iomanip>`
3	`using namespace std;`
4	
5	`int main()`
6	`{`
7	`  float a = 89.74, b = 6.7893412, c = 33;`
8	
9	`  cout << left << setprecision(3);`
10	`  cout << setw(5) << a << setw(10) << b << endl;`
11	
12	`  cout << right << fixed << setprecision(4);`
13	`  cout << setw(7) << a << setw(8) << b << endl;`
14	`  return 0;`
15	`  }`

Answer:

Table 4: Outputs for Program 4

Line	Outputs															
12																
15																

b. Based on the **Program 5** and using the input given in **Table 5**, demonstrate the corresponding output to be displayed for each of the corresponding codes in Code 1 and Code 2. Write the output in **Table 6**. (4 marks)

```
1   // Program 5
2   #include <iostream>
3   #include <iomanip>
4
5   int main()
6   {
7     char word[20], word2[5];
8
9     cout << "Enter a string: ";
10    // either Code 1 or 2
11    // will be placed here
12
13    return 0;
14  }
```

Table 5: Codes and inputs for Program 3

Codes	Inputs

//Code 1
`cin.getline(word, 8);`
`cout << setw(15) << word << endl;`
	`How are you? Good luck!`

//Code 2
`cin >> setw(10) >> word;`
`cout << setw(15) << word << endl;`
	`HowAreYou?GoodLuck!`

Answer:

Table 6: Output for Program 5

Code	Output															
1																
2																

QUESTION 8 **[10 MARKS]**

Program 6 is a program to rotate right element of array that receives size of array and the integer as element in the array as input from the user. Complete a function called `rotateRight` in **Program 6** that accepts two parameters, an integer array and the size of the array. The function will move one element to the right of array except for the final element of the array which will be moved to the first element. **Figure 3** shows a sample of array, before and after rotation of one element is applied. Meanwhile, **Figure 4** shows the example of program's input and output. (Hint: dynamic memory allocation is not required).

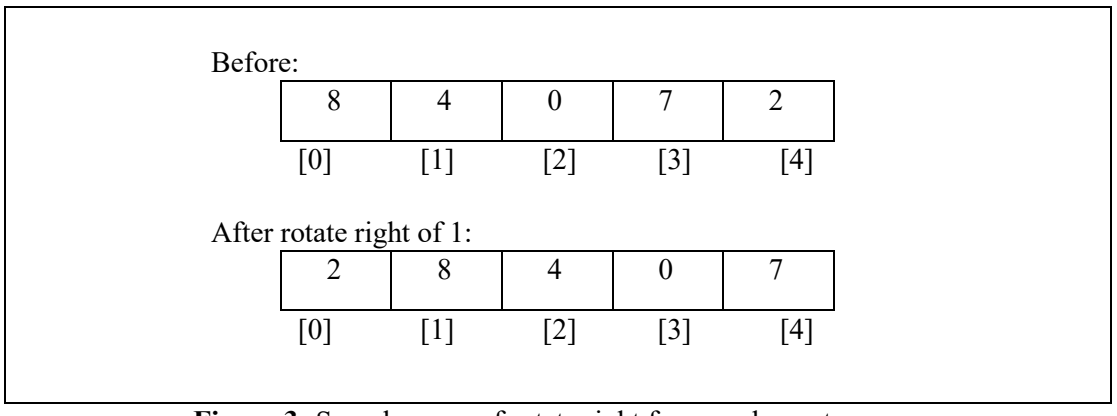

Figure 3: Sample array of rotate right for one element moves.

```
Size of array: 5 [Enter]
A[0]: 8 [Enter]
A[1]: 4 [Enter]
A[2]: 0 [Enter]
A[3]: 7 [Enter]
A[4]: 2 [Enter]

Before rotation: 8 4 0 7 2
After rotation : 2 8 4 0 7
```

Figure 4: Sample of run – example of program's input and output.

```
1  // Program 6
2  #include <iostream>
3  #define N 12
4  using namespace std;
5
6  void rotateRight (int A[], int size)
7  {
8  //Complete your code here
9
10
11
12
13
14
15
16
17
18
19
20
21
22 }
23
24 int main()
25 {
26       int A[N], size;
27
28       cout << "Size of array: ";
29       cin >> size;
30
31       for (int i = 0; i < size; i++)
32       {
33             cout << "A[" << i << "]: ";
34             cin >> A[i];
35       }
36
37        cout << endl;
38
39        cout << "Before rotation: ";
40
41        for (int i = 0; i < size; i++)
42             cout << A[i] << "\t";
43       cout << endl;
44
45       rotateRight(A, size);
46
47       cout << "After rotation: ";
48
49      for (int i = 0; i < size; i++)
50            cout << A[i] << "\t";
51       cout << endl;
52
53       return 0;
54 }
```