CONFIDENTIAL

UNIVERSITI TEKNOLOGI MALAYSIA

MID TERM TEST

SEMESTER I 2017/2018

SUBJECT CODE	**: SCSJ10123**
SUBJECT NAME	**: PROGRAMMING TECHNIQUE II**
YEAR/COURSE	**: 1 (SCSJ / SCSV / SCSB / SCSR / SCSD)**
TIME	**: (2 HOURS 30 MINUTES)**
DATE	**: 16th NOVEMBER 2017**
VENUE	**: N28 BK5**

INSTRUCTIONS:

SECTION A: 4 STRUCTURED QUESTIONS	(70 MARKS)
SECTION B: 1 PROGRAMMING QUESTION	(30 MARKS)
TOTAL	(100 MARKS)

ANSWER ALL QUESTIONS IN THIS BOOKLET AT THE SPACES PROVIDED.

Additional answer sheets will be given upon request.

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

(This question booklet consists of 14 pages including this page.)

SECTION A: STRUCTURED QUESTIONS [70 MARKS]

Question 1 **[20 marks]**

.

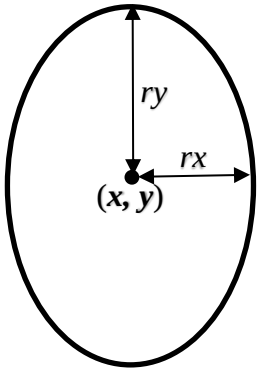


Figure 1

An ellipse can be represented by its center point *(x, y)*, horizontal radius, *rx* and vertical radius, *ry* as shown in Figure 1. A circle is a special type of an ellipse in which *rx* and *ry* are the same length. Given the definition of a class representing an ellipse in **Program 1** below. Answer questions (a), (b) and (c).

```
 1  // Program 1
 2
 3  class Ellipse{
 4        private:
 5              int x, y;
 6              int rx, ry;
 7
 8        public:
 9              Ellipse() {x=y=rx=ry=0;}
10              Ellipse(int r) { x=y=0; rx=ry=r;}
11              Ellipse(int _rx, int _ry) {x=y=0; rx=_rx; ry=_ry;}
12
13              Ellipse(int _x, int _y, int r )
14              {x=_x; y=_y; rx=ry=r;}
15
16              Ellipse(int _x, int _y, int _rx, int _ry)
17              { x=_x; y=_y; rx=_rx; ry=_ry;}
18
19              void setRadius(int _rx, int _ry){rx=_rx; ry=_ry;}
20 };
21
```

a) In general, what is the purpose of having several constructors in a class? (4 marks)

b) Write five different code in which each code will be creating a circle with the center at the origin (0,0) and the radius of 10 unit from the class `Ellipse`. (10 marks)

c) What if the class `Ellipse` is added with another constructor as given below? Justify your answer. (6 marks)

```
Ellipse(int _x, int _y) {x=_x; y=_y; rx=ry=0;}
```

Question 2 **[20 marks]**

Consider **Program 2** below which defines a class named `Person`.

```
 1  // Program 2
 2
 3  #include<iostream>
 4  using namespace std;
 5
 6  class Person{
 7        private:
 8           string name;
 9
10        public:
11          Person(string _name){
12              name=_name;
13              cout << "An object has been created with name "
14                   << name << endl;
15          }
16
17          ~Person(){
18               cout << "The object with name " << name
19                    << " is being deleted" << endl;
20           }
21
22           void print() const{
23                cout << "The person's name is " << name << endl;
24           }
25  }; // End of class Person
26
27  void display(){
28        Person p1("Ahmad");
29        p1.print();
30  }
31
32  void display(Person &p2){
33        p2.print();
34  }
35
36  int main(){
37        Person p3("Lim");
38
39        Person p4("Rajoo");
40
41        display();
42
43        display(p4);
44
45        p3.print();
46
47        p4.print();
48
49        return 0; }
50
```

Determine the screen output produced at the following lines. (20 marks)

Line	Output
37	
39	
41	
43	
45	
47	
49	

Question 3 **[14 marks]**

Program 3 below is intended to evaluate an arithmetic expression. The expression is entered by the user in a single string, such as 20 + 30. The program is designed to handle only for two-digit numbers, i.e., 10 to 99 and four basic arithmetic operations, i.e., addition (+), subtraction (-), multiplication (*) and division (/). Complete **Program 3** based on the questions (a), (b), (c), (d) and (e) stated as comments in the program.

```
1  // Program 3
2
3  #include<iostream>
4  #include<cstdlib>
5
6  using namespace std;
7
8  class Operand{
9       private:
10           string value;
11
12      public:
13           Operand(string _value=""){value=_value;}
14           void setValue(string _value){value=_value;}
15           string getValue() const {return value;}
16           int stringToInteger(){return atoi(value.c_str());}
17 };
18
19 int main()
20 {
21     // (a). Read the string of arithmetic expression from the keyboard and
22     //      store it in the variable expression.                    (1 mark)
23
24      string expression;
25
26      cout <<"Enter an arithmetic expression => ";
27
28
29      _____________________________________________________________
30
31
32     // (b). Extract the operator and both operands from expression and store them
33     //      into three different variables.                         (3 marks)
34
35      _____________________________________________________________
36
37
38      _____________________________________________________________
39
40
41      _____________________________________________________________
42
43
```

```
44      // (c). Create two objects of Operand and specify the value of each object with
45      //      the operand extracted in step (b) accordingly.                    (2 marks)
46
47
48      _____
49
50      _____
51
52
53
54
55      // (d). Convert the value of each operand from string to integer using the appropriate
56      //      method from the class Operand.                                    (2 marks)
57
58      _____
59
60
61      _____
62
63
64
65      // (e). Determine the type of operation (i.e., either +, -, *, or / ) and
66      //      perform the arithmetic calculation accordingly.                   (5 marks)
67
68
69
70      _____
71
72      _____
73
74      _____
75
76      _____
77
78      _____
79
80      _____
81
82      _____
83
84
85      // (e). Print the result onto the screen. The output should look like below:  (1 mark)
86      //                  20 + 30 is 50
87
88      _____
89
90      return 0;
91
92  } // End of main function
93
```

Question 4 **[16 marks]**

Consider **Program 4** below. Answer questions (a), (b), (c) and (d).

```
 1  // Program 4
 2
 3  #include<iostream>
 4  #include<fstream>
 5
 6  using namespace std;
 7
 8  int main()
 9  {
10        fstream fin,fout;
11        string file1, file2;
12        int n;
13
14        cout << "Enter the first file's name =>";
15        cin >> file1;
16
17        cout << "Enter the second file's name =>";
18        cin >> file2;
19
20        fin.open(file1.c_str(), ios::in|ios::binary);
21        fout.open(file2.c_str(), ios::out|ios::binary);
22
23        fin.seekg(0,ios::end);
24        n= fin.tellg();
25
26        fin.seekg(0,ios::beg);
27
28        char data[20000];
29        fin.read(data, n);
30        fout.write(data,n);
31
32        fin.close();
33        fout.close();
34
35        return 0;
36  }
37
```

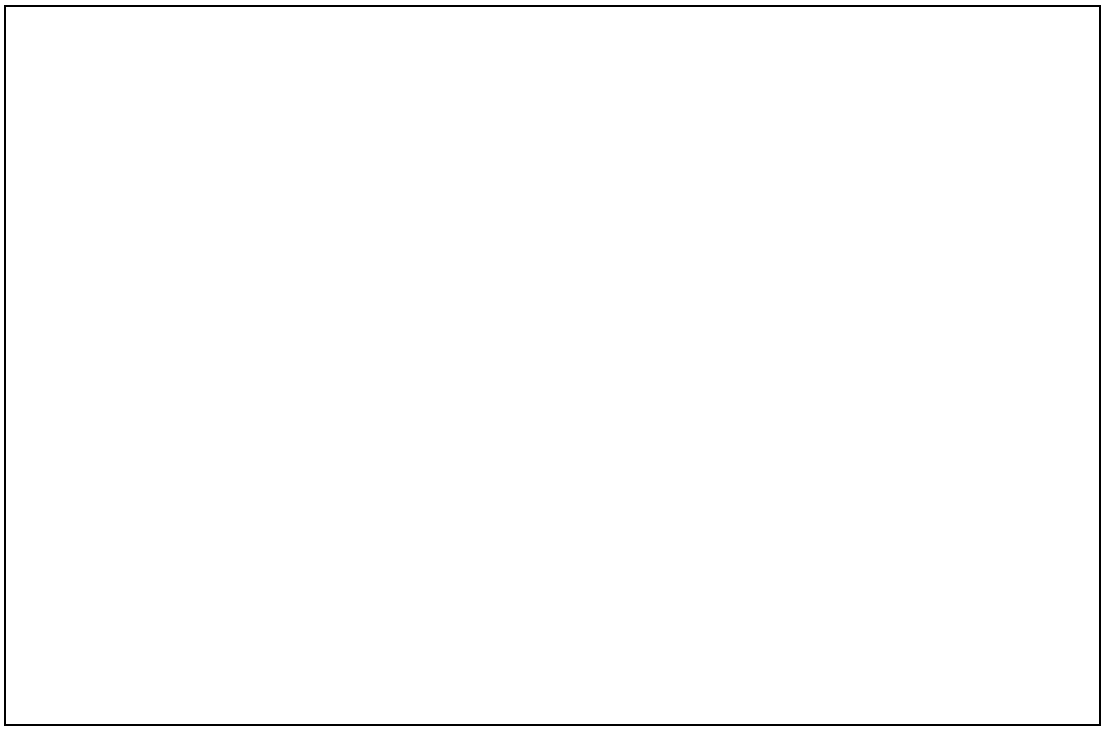
a) What is the purpose of the program? (2 marks)

b) Describe the role of the following line(s) in the program in terms of their context or meaning. (8 marks)

Line	Answer
20 - 21	
23 - 24	
26	
29 - 30	

c) The program in fact faces a problem due to lines 27 to 29. Describe what the problem is. (2 marks)

d) Rewrite the code for lines 27 to 29 to resolve the problem. (4 marks)



SECTION B: PROGRAMMING QUESTION TOTAL – 30 MARKS

This section consists of **ONE (1)** question only.

Question

ABC Minimart is moving towards the use of computer system to catalogue all the products it sells. The information that needs to be stored for each product consists of the product's code, price and quantity.

Develop a computer program in C++ language using the Object-Oriented Programming approach. Your program needs to fulfill the following requirements:

a. A class for representing a product with proper **attributes**, a **constructor**, **mutators** and **accessors** needs to be defined in the program. (11 marks)

b. The program should provide a mechanism that allows the user to enter the information of a list of products from the keyboard. (6 marks)

c. All the products entered by the user should be stored in an array of objects. (4 marks)

d. Then, the list of products should be saved into a binary file. (3 marks)

e. Also, the list of products should be printed onto the screen along with their total prices. (6 marks)

Figure 2 shows what your program should look like when it runs. Note that, the **bold** texts indicate user inputs.

```
How many products you want to enter => 3

Enter Product #1:
  Code => 201
  Price => 10
  Quantity => 50

Enter Product #2:
  Code => 88
  Price => 2.50
  Quantity => 20
```

```
Enter Product #3:
  Code => 9
  Price => 2.30
  Quantity => 10

Data entry summary

No.     Product Code    Price   Quantity     Total
1       201             10      50           500
2       88              2.5     20           50
3       9               2.3     10           23

Dear user. The list has also been saved in a binary file
```

Figure 2

Answer spaces for Section B

Answer spaces for Section B

Answer spaces for Section B