Open University of Mauritius

BSc (HONS) APPLIED ICT WITH SPECIALISATION [OUbs017]

EXAMINATIONS FOR:	November/December 2017
MODULE:	**Object Oriented Programming (OUbs017214)**
DURATION:	2 HOURS
READING TIME:	10 minutes

INSTRUCTIONS TO CANDIDATES

1. The paper consists of **THREE (3)** questions.
2. Answer **ALL** questions.
3. Always start a new question on a fresh page.
4. Total marks: 100

This question paper contains 3 questions and 7 pages.

ANSWER ALL QUESTIONS

QUESTION 1: (40 MARKS)

Read the following case study:

ABC autoparts is a private corporate organization, member of the automobile aftermarket. Its main activity is the import and selling of motor vehicle spare parts. Its main customers are the individual owners of motor vehicles, garages, resellers and supermarkets. It also exports to some islands of the Indian Ocean, and is targeting an ecommerce audience very soon.

When an order is received, either by a walk in customer or by phone/email/tender, a salesman will handle the request. He will check the availability of the products, and provide the prices. He can then issue a quotation, or prepare the invoice, if the customer agrees to make the sale.

If an item is not available, the salesman can propose the customer to make a special order for him. Obviously, the price will be higher, because the customer will need to pay for the freight fees by sea, air or DHL. The customer will need to provide a cash deposit to enjoy this facility.

There are different pricing policies. Customers who buy in large quantities are allowed special discounted prices, else a normal reasonable discount can be given by the salesmen themselves. The Marketing department is considering to provide a fidelity card to specific customers very soon. These customers will enjoy a special discount between 2% and 15% of the sales amount.

If the sale is concluded, the customer pays at the cashier. It was a time when only cash, credit cards (such as *Visa, MasterCard*) and credit sales were possible. This year, new methods of payment have been introduced, such as *Orange Money, Juice, Emtel Cash*, and the trend seems to have more to come soon. All discount needs the approval of the Shop Supervisor through a signature on the invoice.

Due to fierce competition, the company is considering to diversify its product line in the near future by selling additional products such as tires and car batteries.

Questions

(a) Draw a Use Case Diagram for the above system. Use <<include>> and <<extends>> where necessary.

(10 marks)

(b) Draw the Class Diagram for the system. Use Inheritance where necessary. Provide at least two sample attributes and methods for each class.

(15 marks)

(c) Draw the Sequence Diagram for the Sale transaction.

(15 marks)

QUESTION 2: (30 MARKS)

The following shows an Object Oriented Java program.

```
package Prog;
public class Mainmenu {
	public static void main(String[] args) {
		int a=45;
		int b=20;
		int c=15;
		int answer=0;

		Calculate mycalcul=new Calculate(a);
		answer=mycalcul.Sum(a);
		mycalcul.Display(answer);

		answer=mycalcul.Sum(a,b);
		mycalcul.Display(answer);

		answer=mycalcul.Sum(a,b,c);
		mycalcul.Display(answer);

		Calculate2 mycalcul2=new Calculate2(a);
```

```
                answer=mycalcul2.Sum(a);
                mycalcul2.Display(answer);

                answer=mycalcul2.Sum2(a);
                mycalcul2.Display(answer);

                answer=mycalcul2.Minus2(a,b);
                mycalcul2.Display(answer);
        }
}


package Prog;
public class Calculate {
        private int num1;
        public Calculate(int num1) {
                super();
                this.num1 = num1;
        }

        public int getNum1() {
                return num1;
        }

        public void setNum1(int num1) {
                this.num1 = num1;
        }

        public void Display(int answer){
                System.out.println("Answer is "+answer);
        }

        public int Sum(int a){
                return a;
```

```
	}

	public int Sum(int a,int b){
		return a+b;
	}

	public int Sum(int a,int b,int c){
		return a+b+c;
	}
}
```

```
package Prog;
public class Calculate2 extends Calculate {

	public Calculate2(int num1) {
		super(num1);
	}

	public int Sum(int a){
		return a+a;
	}

	public int Sum2(int a){
		return a+a+a;
	}

	public int Minus2(int a,int b){
		return a-b;
	}
}
```

Explain briefly the following Object Oriented concepts, and show how they are achieved in the above program.

(a) Local variable

(b) Instance variable

(c) Method

(d) Inheritance

(e) Constructor

(f) Encapsulation (getters and setters)

(g) Method overloading

(h) Method overriding

(i) Super keyword

(j) Interface

(10 x 3 marks)

QUESTION 3: (30 MARKS)

The following shows a Java program that works with Files.

```
1)  package hw2;
2)
3)  import java.io.File;
4)  import java.io.FileNotFoundException;
5)  import java.util.InputMismatchException;
6)  import java.io.PrintWriter;
7)  import java.util.Scanner;
8)
9)  public class hw2 {
10)         public static void main(String args[]){
11)
12)                 Scanner input = new Scanner(System.in);
13)
14)                 int age = 0;
15)                 String name;
16)
17)                 File folder = new File("C:/Staff");
18)                 folder.mkdir();
19)
20)                 File text = new File("/C:/Staff/Names.txt");
21)                 PrintWriter pw1 = null;
22)
23)
24)                 do{
25)                         System.out.print("Enter name: ");
26)                         name = input.nextLine();
27)                 }while(name.length() == 0);
28)
```

```
29)
30)                 try{
31)
32)                         do{
33)                                 System.out.print("Enter age: ");
34)                                 age = input.nextInt();
35)                         }while(age < 18 || age > 100);
36)
37)                 }
38)
39)                 catch(InputMismatchException e){
40)                         System.out.println("InputMismatchExeption : Enter numbers
    only.");
41)
42)                 }
43)
44)                 try{
45)                         pw1 = new PrintWriter(text);
46)                         pw1.println("Name = " + name);
47)             pw1.println("Age = " + age);
48)                 }
49)
50)                 catch(FileNotFoundException e){
51)                         System.out.println(e);
52)                 }
53)
54)
55)                 finally
56)                 {
57)
58)                         pw1.close();
59)                         input.close();
60)                 }
61)
62)
63)         }
64) }
```

(a) Explain the lines 1, 3, 12, 14, 20, 26, 27, 35, 58 and 59.

(10 x 2 marks)

(b) What is the purpose of the Try – Catch – Finally block? Describe two other situations where it can be used.

(5 marks)

(c) What happens if several Catch blocks match the type of the thrown object?

(2 marks)

(d) What is the key reason for using Finally blocks?

(3 marks)