Sri Lanka Institute of Information Technology

# B.Sc. Special Honours Degree
In
# Information Technology

## Final Examination
## Year 2, Semester 1 (2017)

# Software Technology-II (IT200)

Duration: 3 Hours

Instruction to Candidates:

- This paper has 5 questions. Answer All Questions.
- Total Marks 100.
- This paper contains 13 pages with the cover Page.

**Question 1** **(20 marks)**

a) *"Even java Adopts its looks from C++, java is different from C++"*
Do you agree with this statement? Justify your answer with a suitable example.
(2 marks)

b) Explain how **shift right bitwise operator** will work with a suitable example.
(2 marks)

c) Discuss **THREE** strengths of Java Programming language compare to the other object oriented programming languages. (3 marks)

d) *A palindrome is a text phrase that is spelled the same backward and forward.* The word *redivider* is a palindrome, since the word would be spelled the same even if the character sequence were reversed. Write a program that takes a string as a keyboard input and reports whether the string is a palindrome

*Hint: You can use nextLine() in scanner class and charAt() method in string class*
(6 marks)

e) Write a java program to add two 2 X 2 matrices and display the resulting matrix. You should get the matrix values as the user input and perform the addition.
(7 marks)

*Hint: matrix addition can be performed as follows*

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix} + \begin{bmatrix} w & x \\ y & z \end{bmatrix} = \begin{bmatrix} a+w & b+x \\ c+y & d+z \end{bmatrix}$$

**Question 2** **(20 marks)**

Assume that you have been asked to develop a software for a Bank using Java programming language. The following is the scenario:

The system manages information related to the Accounts held at this bank. *Accounts* are of two categories: *Savings Account* and *Current Account*. An account has account number, account name and balance as its properties. Users should be able to deposit, withdraw and check balance regardless of the type of the account they hold. The deposit and withdraw operations should be implemented in the way it updates the balance accordingly when the amount deposited or withdrawn in given as a parameter. When withdrawing an amount you may have to first check whether the account has sufficient balance from which the amount can be withdrawn. The check balance operation should return the current balance of the account.

Savings Account is a bank account associated with an interest rate. Interest is calculated and added to the balance periodically. Savings Account has account number, account name, balance and interest rate (a percentage) as its properties. Savings Account has a method called addInterest() that applies the interest rate on the balance currently available in the account and updates its balance by depositing the interest calculated.

Current Account is a bank account with some number of free transaction and a fee charged for subsequent transactions. Current Account has account number, account name, balance, number of transactions (initially zero), number of free transactions permitted, and the fee for each extra transactions. There should be a track of records for the number of deposits and withdrawals done on Current account. Thus, the number of transactions stored need to updated as and when a deposit or withdraw transaction happens. For *any* Current Account created, the bank allows first three transactions to be free and from there onwards each transaction will be charged Rs.500/- regardless of the amount being transferred. To implement this operation Current Account should have a method called deductFee(). deductFee() method should calculate the fee that needs to be deducted from one's account. The fee is only applicable for each transaction that exceed the free transaction count. Also note that once the fee is calculated the amount needs to be deducted from the account balance as a withdraw operation.

a) Implement the Account class and implement the following features.

- Apply data hiding capabilities to the defined class.
- Implement deposit(), withdraw() and checkBalance() methods.
- Include a constructor that will take the values relating to the account number, account name and balance.
- Overload the constructor in a way it accepts only the account number and balance.

Hint: use this, this() keywords appropriately (6 marks)

b) Implement the Savings Account class and implement the following features.

- Implement addInterest() method.
- Include the constructor that will take the values relating to the account number, account name, balance and interest rate.

Hint: use this, super() keywords appropriately (5 marks)

c) Implement the Current Account class and implement the following features.

- Implement deductFee() method.
- Override the deposit() and withdraw() methods with appropriate changes.
- Include the constructor that will take the values relating to the account number, account name and balance. When a Current Account is created the number of transactions took place in that account is initially zero.

Hint: use this, super, super() keywords appropriately (9 marks)

**Question 3** **(20 marks)**

a) What will be the output of the following code segment when you try to compile and execute it? State reasons for your answer. (3 marks)

```
class Student {

   String name;
   String regNumber;
   double average;

   String getDetails() {
      return "Student information " + this.name + " " +
this.regNumber;
   }

   final void calcAverage(double mark1, double mark2) {
      System.out.println(average = (mark1 + mark2) / 2);
   }

}

class PartTimeStudent extends Student {

   String name;
   final void calcAverage(double mark1, double mark2) {
    System.out.println(  average = (mark1 + mark2) / 2 +10);
   }

}

class Question{
   public static void main(String[] args) {
      PartTimeStudent pt = new PartTimeStudent();
      pt.calcAverage(50, 30);
   }
}
```

b) What will be the output of the following code segment when you try to compile and execute it? State reasons for your answer. (3 marks)

```
class Person {

   static String name;

   Person(String name) {
      this.name = name;
   }

   Person() {

   }

}

public class Question01 {

   public static void main(String[] args) {
      Person p1 = new Person("Sunil");
      Person p2 = new Person();

      p2.name = "Nimal";

      System.out.println("p1 Name : " + p1.name);
      System.out.println("p2 Name : " + p2.name);

   }
}
```

c) What will be the output of the following code segment when you try to compile and execute it? State reasons for your answer. (3 marks)

```
class Student {

   private String name;
   private String regNumber;
   private double gpa;

   public Student(String name, String regNumber, double gpa) {
      this.name = name;
      this.regNumber = regNumber;
      this.gpa = gpa;
   }
}

class PartTimeEmployee extends Student {

   double salary;

   public PartTimeEmployee(double salary, String name, String
regNumber, double gpa) {
      super();
      this.salary = salary;
   }


}

class Demo {

   public static void main(String[] args) {
      PartTimeEmployee  pt  = new PartTimeEmployee(10000, "Perera",
"IT123456", 3.7);
   }
}
```

d) What will be the output of the following code segment when you try to compile and execute it? State reasons for your answer. (3 marks)

```
class Parent {

   private int x;
   private int y;

   double addition() {
      return (x + y);
   }
}

public class Child extends Parent {
        String name;
        String address;

       Child ( String n , String address){
              name = n;
              address = a;
       }

      Child ( String n){
            this(n);
     }
}
```

e) What will be the output of the following code segment when you try to compile and execute it? State reasons for your answer. (4 marks)

```
interface Employee {

   String company = "ABC Orgnization";

   public double calcSalary();

}

class Student {

   private String name;
   private String regNumber;
   private String gpa;

   void getDetails() {
      System.out.println("My Name " + this.name);
   }

}

class PartTimeEmployee extends Student implements Employee {

   double salary;

   void getDetails() {
      System.out.println("My Information " + salary);
   }
}
```

f) What will be the output of the following code segment when you try to compile and execute it? State reasons for your answer. (4 marks)

```
class Student {

   String name;
   String gpa;

   void getDetails() {
      System.out.println(this.name);
      System.out.println(this.gpa);
   }
}

class PartTimeStudent extends Student {

   double salary;

   public PartTimeStudent(double salary) {
      this.salary = salary;
   }

}

public class Question4 {

   public static void main(String[] args) {

      Student st = new PartTimeStudent(100000.00);
      PartTimeStudent ps = (PartTimeStudent) st;

      st.name = "Henry Jayasinghe";
      st.salary = 150000;
   }

}
```

**Question 4** **(20 marks)**

a) *"There are three statements in a try block – statement1, statement2 and statement3. After that there is a catch block to catch the exceptions occurred in the try block. An exception has occurred in statement2 and the statement3 get executed and terminate the program"*

Accept or Deny the above statement by giving suitable reasons for your stance. (2 marks)

b) Using a suitable example briefly explain the difference between Checked Exception and Unchecked Exception in Java. (4 marks)

c) Compare and contrast the throw and throws keyword in Java. You may use suitable examples to support your answer. (4 marks)

d) Explain the difference between **preemptive scheduling** and **time slicing** in java thread scheduling. (3 marks)

e) "If any thread is in sleeping or waiting state (i.e. sleep() or wait() is invoked), we can interrupt the thread to break out the sleeping or waiting states." List THREE possible methods that can be used to interrupt the threads. (3 marks)

f) Explain the output of the following code segment (4 marks)

```
class TestMultiPriority1 extends Thread{
 public void run(){
  System.out.println("running thread name is:"+Thread.currentThread().getName());
  System.out.println("running thread priority is:"+Thread.currentThread().getPriority());

 }
 public static void main(String args[]){
 TestMultiPriority1 m1=new TestMultiPriority1();
 TestMultiPriority1 m2=new TestMultiPriority1();
 m1.setPriority(Thread.MIN_PRIORITY);
 m2.setPriority(Thread.MAX_PRIORITY);
 m1.start();
 m2.start();

 }
}
```

**Question 5** **(20 marks)**

a) State the FOUR Components available in J2EE Applications. (2 marks)

b) Explain the importance of using the java beans in software development. (3 marks)

c) Compare and contrast the Advantages and limitations of Hibernate framework. (4 marks)

*d) "JSP pages execute as servlets but allow a more natural approach to creating static content"*

Do you agree with the above statement? Justify your answer with suitable examples. (2 marks)

e) Design a solution how enterprise java beans can be used in a "Hotel Reservation System". Your solution should clearly state which components should be implemented using the THREE types of enterprise beans. You may use a diagram to support your answer. (9 marks)

---------- **End of the Paper**----------