Sri Lanka Institute of Information Technology

B.Sc. Special Honours Degree/Diploma in Information Technology

Final Examination
Year 2, Semester 1 (2016)

IT200 - Software Technology II

Duration: 3 Hours

October 2016

Instructions to Candidates:

- This paper contains 5 questions.
- Answer all the questions.
- Provide the answers in the booklets given.
- Total marks for the paper is 100.
- Mark for each question is mentioned in the paper.
- This paper contains 14 pages including the cover page.

Question 1 (20 marks)

a) *"Java is a not a robust programming language."* Do you agree with this statement? Justify your answer. (2 marks)

b) Explain the purpose of Java Virtual Machine (JVM). (2 marks)

c) Giving an example briefly explain the two methods of creating Strings and state the difference between the two methods. (4 marks)

d) Write a Java program to get following output;

*	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9
2	2	4	6	8	10	12	14	16	18
3	3	6	9	12	15	18	21	24	27
4	4	8	12	16	20	24	28	32	36
5	5	10	15	20	25	30	35	40	45
6	6	12	18	24	30	36	42	48	54
7	7	14	21	28	35	42	49	56	63
8	8	16	24	32	40	48	56	64	72
9	9	18	27	36	45	54	63	72	81

(5 marks)

e) Write a Java program to convert an input binary string into corresponding decimal input. Get the binary value as a keyboard input. You also need to check whether user input is a valid binary value.

```
Enter a Binary string: 1011
The equivalent decimal number for binary "1011" is: 11

Enter a Binary string: 1234
error: invalid binary string "1234"
```

Hint: You may use **charAt()** method in the String class, **Charater. getNumericValue()** method to convert a character to numeric value and **Math.pow(x,y)** to compute the x value raised to the power of y (x^y). (7 marks)

Question 2 (20 marks)

a) Using an example briefly explain the difference between *Abstract class* and *Final class.* (3 marks)

b) Compare and contrast **static** *variables* and **non-static** *variables* by giving **ONE** example for each variable type. (3 marks)

c) *"Constructor inheritance is possible".*
Do you agree with this statement? Justify your answer with reasons. (2 marks)

d) Given below is a scenario of a Hospital Managements System. Read the scenario and model the class structure according to the given functionality of the hospital system. You may use the steps given at the end of the scenario to model your answer. (12 marks)

MediCare is a leading hospital in Sri Lanka. There are two categories of patients visit the hospital daily basis; out-patients (a patient who receives medical treatment without being admitted to a hospital) and in-patients (a patient who stays in a hospital while under treatment). The hospital records the personal information (name, age, address, telephone number etc) of the patients.

Nimal is an OPD patient. Hospital records Nimal's personal information and issues an OPD number. Nimal pays Rs. 500 as hospital chargers and visits the doctor when his number is called. Doctor inquiries about Nimal's illness and prescribes medicine. Hospital will maintain details about the prescribed medicine.

Sunila suffers from a severe skin rash and visits the MediCare to channel a Dermatologist (Skin Specialist). Hospital receptionist asks to Sunila pay Rs. 2500 (hospital charges – Rs. 500 + Consultant charges – Rs 2000). Once the payment is made, Sunila is given an appointment (a date and a time). The hospital will maintain details of the Dermatologist's diagnosis and prescribed medicine.

Anoma is an in-patient. Hospital will maintain the details such as date of admittance, doctor in-charge, medicine given, date of release etc. Anoma will be charged for the number of days she has been staying at the hospital, medicine given, number of doctor constulations. Anoma has to pay the bill when she is released from the hospital.

Out-patients settle their bills when the appointment is placed. In-patients pay the bill when they are released from the hospital. Hospital will always register new patients. There are different categories of out-patients. (e.g. OPD Patients *(Nimal),* Patients consulting specialists *(Sunila)).*

Step1: Identify the classes for the given scenario with their attributes and the methods.

Step2: Identify any relationships among classes such as hierarchical or association.

Step3: Identify the necessary accesses modifiers, data types and return types for attributes and method. (You need not to implement the method bodies).

Step4: Implement the final class set with their relationships using java language.

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)

```
public class Example01 {

  static String sname = "SLIIT";

  public static void main (String args[]) {
  float x =25.2f;
    System.out.println(x);
    setName();
  }

  public  void setName(){
    sname = "APIIT";
    System.out.println(sname);
  }
}
```

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)

```
public class Example02 {

  public static void main (String args[]) throws IOException{

    System.out.print("Input String : ");
    InputStreamReader ins  = new InputStreamReader(System.in);
    BufferedReader bff = new BufferedReader(ins);
    String s1 = bff.readLine();

    StringBuffer  sb = new StringBuffer(s1);
    String s2 =  new String(sb.toString());
    String s3 = s2;

    System.out.println(s1==s2);
    System.out.println(s1==s3);
    System.out.println(s2.equals(s3));

  }
}
```

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 Parent {

   private int x;
   private int y;

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

public class Child extends Parent {

   String add() {
      return ("Hello Java");
   }

   public static void main(String args[]) {

      Child nw = new Child ();
      System.out.println(nw.add());
   }
}
```

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 addition(String abc) {
      return (abc);
   }

   public static void main(String args[]) {

      Child nw = new Child ();
      System.out.println(nw.addition("Test Java"));
   }
}
```

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)

```
class Bird {

   int noOfWings;
   String name;

   public void flyBird() {
      System.out.println("Bird Flew Away");
   }
}

class Parrot extends Bird {

   String parrotOwner;

   public void flyBird() {
      System.out.println("Parrot Parrot");
   }
}

public class Test {

   public static void main(String args[]) {

      Bird b = new Parrot();
      b.flyBird();
   }
}
```

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)

```
abstract class Employee {

   String name;

   abstract public void calcSalary();
}


class PartTimeEmployee extends Employee {

   float hourlyRate;
   float netSalary;

   public float getHourlyRate() {
      return hourlyRate;
   }

   public float getNetSalary() {
      return netSalary;
   }
}
```

Question 4 (20 marks)

a) What are the two types of runtime errors and list their differences. (3 marks)

b) Nimal is designing an Account class. Account class contains a method called withdraw() which is used for withdraw money. The amount user wishes to withdraw is given as a keyboard input. You need to implement your own exception class (InsufficientFunds) to check whether the amount user wishes to withdraw is less than or equal to the existing account balance. Identify the exceptions that can occur within the program code as well. (8 marks)

```
Import java.io.*;
class Account{

   public static void withdraw(){
   float accountBalance = 1000000;
    try{
        System.out.print("Enter withdrawal amount : ");
        InputStreamReader ins = new InputStreamReader (System.in);
        BufferedReader bf = new BufferedReader (ins);
        String input = bf.readLine();

        float amount= Float.parseFloat(input);

     }
```

Rewrite the program by using the following instructions

- Implement user defined exception class called InsufficientFunds
- The program should handle all the identified exceptions in the code given.

c) What is thread pool? What is the usage of thread pool? (2 marks)

d) Write a java thread to print multiples of 03 from 0 to 100 along with the thread name, with an interval of 1 second. (You can use any thread creation method and you can use any number of threads you need.) (7 marks)

A sample output is given below.

```
Current thread : Thread name :main
Current thread : Thread-0 count =3
Current thread : Thread-0 count =6
Current thread : Thread-0 count =9
Current thread : Thread-0 count =12
Current thread : Thread-0 count =15
Current thread : Thread-0 count =18
Current thread : Thread-0 count =21
Current thread : Thread-0 count =24
Current thread : Thread-0 count =27
Current thread : Thread-0 count =30
Current thread : Thread-0 count =33
Current thread : Thread-0 count =36
Current thread : Thread-0 count =39
Current thread : Thread-0 count =42
Current thread : Thread-0 count =45
Current thread : Thread-0 count =48
Current thread : Thread-0 count =51
Current thread : Thread-0 count =54
```

Question 5 **(20 marks)**

a) Using a suitable example briefly explain the 3-tier architecture. (3 marks)

b) Explain FOUR benefits of using EJB in Enterprise Application Development. (4 marks)

c) List down the different types of Entity beans and name the technologies that have been replaced by the Entity beans. (3 marks)

d) Compare and contrast the different types of session beans. (4 marks)

e) Explain the difference between CGI and Servlet. (3 marks)

f) Using a suitable example explain TWO different types of JEE APIs. (3 marks)

----------End of Question Paper----------