Date: 19/09/17

Ahsanullah University of Science & Technology
Department of Computer Science and Engineering
Year: 1st, Semester: 2nd, Final Examination (Spring 2017)

Course No: CSE 1205 — **Course Title: Object Oriented Programming**
Full Marks: 70 — **Time: 3 Hours**

**[There are Seven (7) Questions. Answer any Five (5).
Marks allotted are indicated in the right margin.]**

1. a) Describe the advantages of object-oriented programming over the procedure-oriented (or structured) programming. 4

b) Write a Java program to input a number and count its even and odd digits and find out their sum separately. 5

Sample Input: 24193

Sample Output: Even Digit : 2; Even Sum : 6
Odd Digit : 3; Odd Sum : 13

c) Write down the output of the following sequence of code: 5

```
public class Q1 {
    int p[] = {2, 3, 1, 2, 1};
    Test t1 = new Test(p);
    Q1(int i) {
        t1 = new Test(p);
    }
    public static void main(String[] args) {
        Q1 t2 = new Q1(5);
    }
}
class Test {
    Test(int x[]) {
        System.out.println("Constructor called ");
        int i = 0;
        while (i < 3) {
            System.out.println(x[i]);
            i = i + 2;
        }
    }
}
```

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2. a) Explain the usefulness of ***this*** keyword with a suitable example. Define ***static*** blocks. Write the advantages of using ***static*** block. 5

b) Create a class named ***IntegerSet***. This class should contain two sets of integer numbers that belong to the range 0 to 100. Each set is represented using an array of ***boolean***. Array element a[i] is ***true*** if integer *i* is in the set. Your class should perform the following operations: 5

i) Create a no-argument constructor to initialize each of the sets as an empty set (all the elements are set to ***false***).

ii) Create a constructor to take input into both of the sets.

iii) Write a method **unionOfSets** to create a third set which is the union of the existing two sets. (An element of the third set is true if that element is true in either or both of the existing sets).

iv) Write a **static** method **insertElement** to insert a new integer *k* into the first set (by setting a[k] to ***true***).

v) Write a method ***printSet*** to print the elements of both the sets.

Write a Java program to create an object of type ***IntegerSet*** and perform all the operations mentioned in the class on that object.

c) Write down the output of the following sequence of code: 4

```
class A {

     A() {
          System.out.println("From Constructor");
     }

     void method(double x) {
          System.out.println("x = " + x);
     }
}
class B extends A {

     void method(int y) {
          System.out.println("y = " + y);
     }

     void method(String s) {
          System.out.println("s = " + s);
     }

     public static void main(String arg[]) {
          A a1 = new A();
          A a2 = new B();
          a1.method(10);
          a2.method(20);
     }
}
```

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3. a) What is the difference between ***method overriding*** and ***method overloading***? Explain with examples. 4

b) What is an ***interface***? What are the possible contents of an ***interface***? State the advantages of using ***interface***. 4

c) Implement an abstract class ***player*** and two subclasses named ***batsman*** and ***bowler***. Each player has a name, contact address, telephone number and status (either batsman or bowler). The ***batsman*** class maintains the total run obtained by a batsman and the number of one day matches he participated. Similarly, the ***bowler*** class maintains the total wickets taken by a player and the total number of matches. The parent class contains an abstract method to calculate the average of each player. Implement the above classes in Java. Provide constructors to initialize the private data. Override the ***toString()*** method in each class to display the class name. 6

Write a program to create an object of type ***batsman*** and ***bowler*** and calculate the average run or wickets obtained by a player. Your program should also call the ***toString()*** method to display the class name.

4. a) "Java String is **immutable**" – explain with an example. What is the difference between ***String*** class & ***StringBuffer*** class? 4

b) Write down the uses of the following methods: 6
(i)charAt (ii) capacity and (iii) setPriority

c) Write down the output of the following sequence of code: 4

```
public class Student {

    int rollno;
    String name;
    static String university = "AUST";

    Student(int r, String n) {
        rollno = r;
        name = n;
    }

    static void display(Student ss[]) {
        int i;
        for (i = 1; i <= 4; i++) {
            System.out.println(ss[i].rollno + " " + ss[i].name + " "
            + university);
        }
    }

    public static void main(String args[]) {
        int i;
        Student s[] = new Student[6];
        for (i = 1; i <= 4; i++) {
            s[i] = new Student(i, Integer.toString(i + 65));
                                                        A
        }
        display(s);
    }
}
```

5. a) What is an ***exception***? Why do we need to handle exception? 4

b) Write a Java code segment that will take a sequence of positive integer numbers as input from the keyboard and find the sum of the odd numbers only. If the input is a negative number, your code segment should throw a ***user-defined*** exception. The ***main***() method should handle this exception and print the error message. 5

c) Generate the output of the following program: 5

```
public class test {
    public static void main(String[] args) {
        test ob = new test();
        try {
            ob.meth1();
        } catch (IllegalAccessException e) {
            System.out.println("Exception caught in main.");
        }
        ob.meth2();
        System.out.println("End of main.");
    }

    void meth2() {
        try {
            System.out.println("Method 2");
            return;
        } finally {
            System.out.println("Method 2 - Finally");
        }
    }
    void meth1() throws IllegalAccessException {
        try {
            throw new IllegalAccessException("test");
        } catch (Exception e) {
            System.out.println("Exception caught in meth1");
            throw new IllegalAccessException("test");
        } finally {
            System.out.println("Method 1 - Finally");
        }
    }

}
```

6. a) What is ***multithreaded programming***? What are the advantages of multithreading? 4

   b) Write down the ways by which Java can create multiple threads. 4

   c) Write a program that will create two threads named ***one*** and ***two*** from the main thread. Each of the thread will display the message "Thread ***name*** Starting", where ***name*** is the name of the thread. Each thread will then print a message "Hello from thread ***name***" 3 times on the screen. Here, ***name*** is the name of the child thread. After each write on the screen it will sleep for 500 milliseconds. Main thread should wait for the termination of the child threads. 6

7. a) What is a ***package***? How can you define your own package? Write a Java program to implement multiple inheritance. 4

   b) What is ***Deadlock***? Explain with an example what happens when threads are not synchronized. How can threads be synchronized? 4

   c) Write a java program using ***FileInputStream*** and ***FileOutputStream*** class to copy the content of one file located at c:\text1.txt to another file located at d:\text2.txt. 6