Question Paper

Exam Date & Time: 07-Dec-2023 (09:30 AM - 12:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

THIRD SEMESTER B.TECH. DEGREE EXAMINATIONS - NOVEMBER / DECEMBER 2023
SUBJECT: ICT 2122- OBJECT ORIENTED PROGRAMMING

Marks: 50 **Duration: 180 mins.**

Answer all the questions.

1A)	Write a java program with a method named diff_value(int a[ ]) which returns the minimum difference between adjacent values in the array. The difference between two adjacent values in an array is defined as the second value minus the first value. For example, suppose a variable called array is an array of integers that stores the following sequence of values: int[] array = {1, 3, 6, 7, 12}; The first gap is 2 (3 - 1), the second gap is 3 (6 - 3), the third gap is 1 (7 - 6) and the fourth gap is 5 (12 - 7). Thus, the call of diff_value(array) should return 1 because that is the smallest gap in the array. If you are passed an array with fewer than 2 elements, you should return 0.	(5)
1B)	Illustrate with suitable code snippets any two non-compliant and compliant rules of Numeric types and Operations with respect to Java CERT	(3)
1C)	Write a JavaFX program that displays a window with a button. When the button is clicked, a label shows a message with your name.	(2)
2A)	Design a generic class "genericInventory" with one type parameter, T. Provide an appropriate constructor that initializes the data member of this class to hold a reference to an array of type T. Implement the following methods: i) *getItem(int id)*: Returns an item object of type T whose *id* is passed in the method argument. If no record is found, display an appropriate message, and return the first item. ii) *sort():* Sorts the records of electrical items based on watt and sort clothing items based on size. Create two classes, ElectronicDevice and ClothingItem, derived from the generic class. ElectronicDevice contains two data members, watt (int) and id (int). ClothingItem contains two data members, size (String) and id (int). Provide a method display() in both classes to print the details on the console output. Write a driver class that: i) Creates an array of ElectronicDevice and ClothingItem objects. ii) Instantiates the generic class on ElectronicDevice and ClothingItem objects and displays them. iii) Invokes the getItem(int id) method on both instances and displays the item details. iv) Uses the instances to sort the records by calling the sort() method.	(5)
2B)	Write a Java program to create an interface Resizable with methods resizeWidth(int width) and resizeHeight(int height) that allow an object to be resized. Create a class Rectangle that implements the Resizable interface and implements all methods.	(3)
2C)	Write the output of the following program:	(2)

```
public class testSystem {
    public void start() {
        try {
            System.out.print("Starting up ");
            throw new Exception();
        } catch (Exception e) {
            System.out.print("Problem ");
            System.exit(0);
        } finally {
            System.out.print("Shutting down ");
        }
    }
    public static void main(String[] args) {
        new testSystem().start();
    }
}
```

3A) Declare a interface **Utility** with the methods: void display_area() and void display_volume(). Create a Class ***FunctionUtility*** which implements the utility interface and has the following methods:
double compute_area_two(int length, int base){ //Write appropriate implementation }
double compute_area_one(int radius) {//Write appropriate implementation }
double compute_circumference(int radius) {//Write appropriate implementation}
double compute_volume(int length, int breadth, int height) {//Write appropriate implementations}
The implementations should be done without constants.
The implementations of the class methods should not be overridden in by any other class.
Define classes Circle, Cuboid with methods to display the area, circumference and volume. While displaying final result, multiply the result with appropriate constants.
Write a complete java code to display the area, circumference and volume of class Circle and Cuboid. (5)

3B) Write a java program that has an abstract class DemoAbstractClass with the methods void display(), boolean checkPallindrome(String). Create a class StringWork{String str} which uses this abstract class for palindrome check. Define suitable main method to demonstrate the working of the program. (3)

3C) Identify the error in the code given below. Write the code to remove the error. (2)

```
abstract class xyz {
void display();
private double compute(int radius) {
                return 2*3.14*radius;
        } }

public class parent extends xyz{
public void display() {
        System.out.println("Hi ");
   }
public static void main(String[] args) {
// TODO Auto-generated method stub
  xyz obj=new xyz();
        } }
```

4A) Write a java code that executes three concurrent processes P1, P2 and P3, where P1 finds even numbers and P2 finds the odd numbers in the range 11 to 21. Finally, P3 will display the even number list generated by P1 followed by odd number list generated by P2. Also, P1 starts first, immediately followed by P2 and this is followed by P3. Ensure the order of completion is P1, P2 and P3. (5)

4B) Answer the following with suitable justification/s: (3)
i) In a java multithreaded program , can we call the run method directly from the Main method?
ii) In a java multithreaded program, can we override the start Method?

4C) A Java program is created to accept a registration number as input, ensuring that any potential data type mismatch issues are properly handled during runtime. The code for the program is provided below and does not meet the specified requirement. Identify the specific issue encountered when running the program. Write the correct Java code to address this issue. (2)

```
// Input Registration Number
    boolean validRegistration = false;
    while (!validRegistration) {
      System.out.print("Enter Registration Number: ");
      registrationNumber = Integer.parseInt(scanner.nextLine());
      validRegistration = true;
    }
```

5A) Create the GUI application with a user interface as given in Figure Q5A using JAVAFx. The application should display the GUI contents (entered and selected) in a label (result is displayed here) on click of the Display button. Handle the user defined exception in case user has not selected the Department. (5)

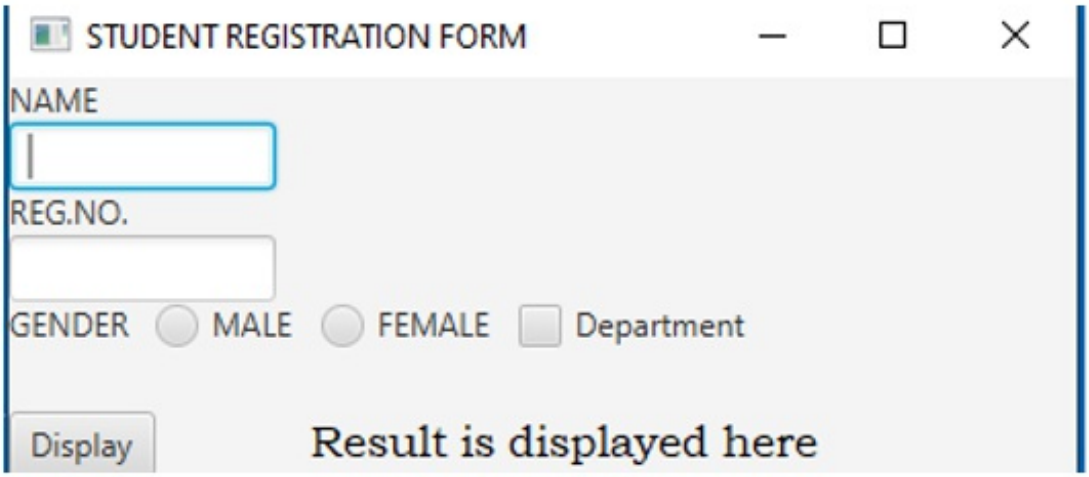

Figure Q5A

5B) Create an application to keep track of list of Students. Student class has Name, RegNo and list of Course Titles along with the suitable method to read and display student information. Handle user define Exception namely EmptyStudentList whenever application does not create the student list. Further, prompt the end user to create the student list. (3)

5C) Would the below code snippet run successfully or not. Justify your answer and provide the correction measure in case of an error. (2)

```
class HelloWorld {
    public static void main(String[] args) {
        String s[] = new String[5];
        System.out.println(" val is "+ s[0].length());
    } }
```

-----End-----