Question Paper

Exam Date & Time: 12-Jan-2024 (09:30 AM - 12:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

THIRD SEMESTER B.TECH. DEGREE EXAMINATIONS -JANUARY 2024
SUBJECT: ICT 2122- OBJECT ORIENTED PROGRAMMING

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

Answer all the questions.

1A)	Design a java application to do the following: i) Create a m x n matrix ii) Write a method countPaths that takes in m and n and returns the number of possible paths from the top left corner to the bottom right corner. Only down and right directions of movement are permitted. iii) Write suitable main method to demonstrate the working of the defined methods Examples Input Matrix: {{1,2},{3,4}} countPaths(m = 2, n = 2) => 2 For the given 2x2 matrix, the two paths are 1->3->4 and 1->2->4	(5)
1B)	MET003-J is the CERT rule identifier which states "methods that perform security checks must be declared private". Illustrate the rule with a suitable method definition.	(3)
1C)	Replace the comment in the code snippet given below with correct javafx code to produce the layout shown in the figure Q1C.	(2)

```
public void start(Stage primaryStage) {

    Button vegies = new Button("Vegies");
    Button beans = new Button("Beans");
```

```
Button rice = new Button("Rice");
Button beer = new Button("Beer");
TextArea text = new TextArea("This is a text area");

/* Write suitable code here to create layout as shown in the Figure Q1C */

Scene scene = new Scene(root, 300, 250);
primaryStage.setScene(scene);
primaryStage.show();
}
```

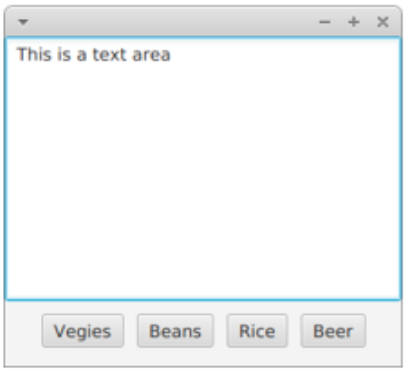

Figure Q1C

2A) Design a simple generic queue class that represents a simple stack data structure. The class should support generic elements and provide methods for inserting(enqueue) and deleting (dequeue) elements. Additionally, implement a method called show () to display the remaining elements in the queue after 2 consecutive dequeue (). (5)

2B) Create an Interface called Currency Converter and define an abstract method convert ToINR(double amount()) and implement the behaviour of currency conversion to different currency converter classes such as Dollar to INR converter, EURO to INR converter. Customize the conversion rates according to the current exchange rates.
(1 US Dollar =83.22 Indian Rupee,1 Indian Rupee =0.012 US Dollar, 1 Indian Rupee = 0.011 Euro) (3)

2C) Analyse following java code snippets for bugs and debug them accordingly with suitable comments. (2)

```
final class A {
A(int x, int y)
{ System.out.println("This is constructor of class A"); }
} // End of class A

class B extends A {
B(int a, int b)
{
super(a,b);
System.out.prinltn("This is consructor of class B");
} // End of class B
```

} // End of class B

3A)	Write the complete code in java for the description provided below. Package pack0 consist of interface utility with methods void display(), void setName(String name), void setCode(int code). Package pack1 consist of class Student with members: String name, int empCode and protected static int countStud. Package pack2 consists of class Faculty with members : String name, int empCode, public static int countFaculty. The class defined in pack1 & pack2 should implement the utility interface defined in pack0. Package pack3 has class UniversityInfo with void studentCount() and void facultyCount() methods. The methods should display count of student and faculty respectively. Note: The Student and Faculty class should have suitable code to keep track of student objects and Faculty objects created. Demonstrate the working of the program by creating two student objects and 3 faculty objects in the main( ). Display their total count with details	(5)
3B)	Create an interface "Mark" with grade() method. Implement the interface Mark in Student class containing Students Name, RegNo and 3 subject marks. Input() method takes input from the keyboard and stores only valid values for marks, computes the average mark and grade if average < 50, as "Fail" else "Pass". The main method must perform the work of reading, computing and displaying only those students details with grade "Pass".	(3)
3C)		(2)

Identify the error in the code snippet given below and write the error free code.

```
class twoD{
    static int  count;
    int x;
    final static int y;
    public twoD(int x, int y) {
            // TODO Auto-generated constructor stub
            this.x=x;
            this.y=y;
        }}
 static {
    count=-1;
```

}

4A) Write a java program to create three threads, the first thread checking the uniqueness of matrix elements, the second calculating row sum, the third calculating the column sum. The main thread reads a square matrix from keyboard and will display whether the given matrix is magic square or not by obtaining the required data from sub threads. (Minimum dimensions of magic square 3 X 3, Magic Square is a square array of numbers, where the sum of each row, column and diagonals are same). (5)

4B) The stack with n capacity is shared between producer and consumer, where n = 5. Producer adds a block to the stack when stack size is less than its capacity. Consumer will consume from the same stack when stack size is greater than 0. Write java program to create 2 threads to achieve thread synchronization in stack using interthread communication. (3)

4C) Demonstrate a program with class named Checking Account with methods deposit () and withdraw (). Create user-defined exception called Insufficient Funds and make withdraw() method to throw this exception. (2)

5A) For the GUI in Figure Q5A, create an application using JavaFx. Make use of Border Layout to place the components as shown in the GUI. The application should do the following: (5)
i) Display the name of the selected colour in the TextField
ii) Count the number of clicks and display the count in the Number of clicks field in the format:
Red: # of clicks on red Blue: # of clicks on blue Green:# of clicks on green
Example: Red:2 Blue: 3 Green : 0

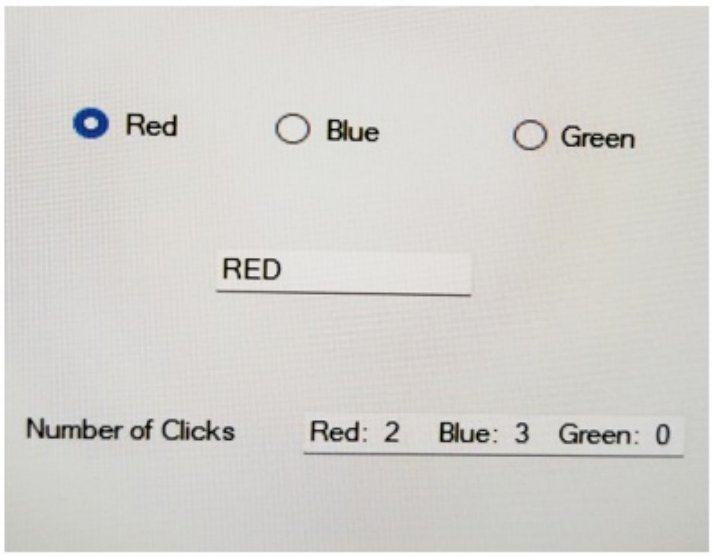

Figure Q5A

5B) Create a matrix class with suitable data instance variables and methods. Assume the condition that each row sum and each column sum are equal. Validate the input matrix for " row sum and column are equal " condition using the user defined exception and also, verify that matrix elements are in the range 0 to 99. (3)

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

```
class NumberFormat_Demo
{
  public static void main(String args[])
  {
```

```
    try {
        int num = Integer.parseInt ("akki") ;
        System.out.println(num);
    }
        catch(Exception e){  System.out.println(e); }
        catch(NumberFormatException e) { System.out.println("Number format exception");
    }
  }
}
```

-----End-----