



SPRING END SEMESTER EXAMINATION-2024

4th Semester B.Tech

OBJECT ORIENTED PROGRAMMING USING JAVA

CS20004

(For 2022 & Previous Admitted Batches)

Time: 2 Hours 30 Minutes

Full Marks: 50

Answer any FIVE questions.

Question paper consists of two SECTIONS i.e. A and B.

Section A is compulsory.

Attempt any Four question from Sections B.

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable and all parts of a question should be answered at one place only.

SECTION-A

1. Answer the following questions: [1 × 10]

(a) Find the output / error for the below code with brief explanation.

```
class Test {  
    public static void main(String[] args) {  
        for(int i = 0; 1; i++) {  
            System.out.println("Hello");  
            break;  
        }  
    }  
}
```

(b) Find the output / error for the below code with brief explanation.

```
class Point {  
    protected int x, y;  
    public Point(int _x, int _y)  
    {  
        x = _x;  
        y = _y;  
    }  
}
```

```

    } }
public class Main {
    public static void main(String args[])
    {
        Point p = new Point();
        System.out.println("x = " + p.x + ", y = " + p.y);
    } }

```

- (c) **Find output/Error for the below code with brief explanation.**

```

import java.io.*;
class Parent{
    void msg()throws Exception {
        System.out.println("parent class method");
    } }
class TestExceptionChild extends Parent{
    void msg()throws ArithmeticException {
        System.out.println("child fclass method");
    }
    public static void main(String args[]){
        Parent p = new TestExceptionChild4();
        try {
            p.msg();
        }catch(Exception e) { }
    } }

```

- (d) **Find the output / error for the below code with brief explanation.**

```

class Test {
    public static void main(String args[ ]) {
        System.out.println(10 + 20 + "KIIT");
        System.out.println("KIIT" + 10 + 20);
    } }

```

- (e) Find the output/error for the below code with brief explanation.

```
class STRING {  
    public static void main(String args[ ]) {  
        String s="DATA";  
        s.concat("SCIENCE");  
        System.out.println(s);  
        s=s.concat("ANALYTICS");  
        System.out.println(s);  
        StringBuffer x = new StringBuffer("KALINGA");  
        System.out.println("The capacity before append is:"+x.capacity());  
        x.append("ODISHA");  
        System.out.println("The capacity after append is:"+x.capacity());  
    }  
}
```

- (f) Find the output/error for the below code with brief explanation.

```
class Exception_Demo  
{  
    public static void main(String args[])  
    {  
        try{  
            throw new ArrayIndexOutOfBoundsException("AIOBE"); }  
        catch(ArithmeticException e){  
            System.out.println("Exception Caught with first catch block"); }  
        catch(Exception e) {  
            System.out.println("Exception Caught with second catch  
block");}}}  
}
```

- (g) Write any two differences between abstract class and interface.
- (h) With suitable example, explain the difference between equals () and == operation on String objects.
- (i) What is the purpose of using sleep() method and join() method with Java threads? Give syntax.
- (j) Which swing component is used to display images and which method is used to add an action listener to a button in Java Swing? Give syntax.

SECTION-B

2. (a) Draw and explain the components of java architecture in detail. What is the significance of byte code in achieving portability? [5]
- (b) Write a program in java to implement Queue data structure. [5]

Create a class Queue having data members Max_Size, an integer array, front, rear and size. Initialize default values for data members in default constructor. The functions enqueue(), dequeue(), isEmpty(), isFull(), size() and display() of Queue class has to be implemented and tested to make your Queue class follows First In First Out principle. The queue must check for overflow and underflow conditions, and handle it as a user defined exceptions.

3. (a) Draw the thread life cycle and explain the different states of a thread. What are the different techniques available in Java for achieving synchronization of threads? Discuss with suitable examples. [5]
- (b) What are the differences between function overriding and function overloading? Write a java program to create an abstract class Bank having an abstract method *getRateofInterest()*. Derive three classes *SBI*, *ICICI* and *HDFC* from Bank class. Now use dynamic method dispatch concept and function overriding concept to override *getRateofInterest()* of bank class with derived class methods to display rate of interest of different banks. [5]
4. (a) Draw picture of multiple inheritance through interface. Explain with example program how multiple inheritance is supported in java through interfaces and not by classes. Explain the rules for ambiguity. [5]

resolution while implementing multiple inheritance using interfaces with suitable example.

- (b) State the differences between String and StringBuffer class. Write a program in java to perform the following operations on string objects. [5]

1. To reverse two strings without using any third variable.
2. To check if two strings are anagrams of each other or not. (Two strings are said to be anagram of each other if they contain the same characters but in different orders: e.g. state & taste)

5. (a) What are the different ways to create a user-defined thread? Write a program in Java to create two user-defined threads which performs the following task respectively. [5]

1. Prints all possible substrings of a given string starting from the first character of the string. After printing each substring, it sleeps for 500 milliseconds (Task-1)

N.B.: If the string is KIIT, it will print K, KI, and KII.

2. Prints the reverse of each strings present in the string array. After printing reverse of each string in the array, it sleeps for 1000 milliseconds (Task-2).

N.B.: Input: {KIIT, SCE, CSE, IT, CSSE, CSCE}

Output: {TIHK, ECS, ESC, TI, ESSC, ECSC}

- (b) Draw the Throwable class hierarchy. State the differences between checked and unchecked exceptions. Write a Java Program to create an user-defined exception called IllegalArgumentException and throw the exception if we pass the negative timeout value in Thread.sleep() method otherwise sleep for given time and display "KIIT University" five times. [5]

6. (a) Create a swing application in Java to create a student's registration page to participate in a University event. The registration entities have to be displayed on a label and corresponding textbox must be available to enter the relevant data. Buttons must be placed on the frame to carry out different operations. The details of the components to be present on the frame are: [5]

Component List:

1. Name(Label & Text Box) :String
2. Roll No (Label & Text Box): Integer
3. CGPA (Label & Text Box): Float
4. Branch : Dropdown Menu (CSE, IT, CSCE, CSSE)
5. Email Id(Label & Text Box): String
6. SUBMIT (Button): To submit the data entered and display the data in the frame on the labels.
7. RESET (Button): To clear all the entered data from the textboxes.
8. CHANGE COLOR (Button): To change the color from GREEN(default) to PINK

Validation Rule:

1. The length of the Roll No must be in the range 7 to 8.
2. The CGPA can't be greater than 10.0 and less than 6.0
3. The Email ID must be in the format <string>@<string>.<string>

An exception must be thrown if any of the validation rules are not satisfied.

- (b) Briefly discuss about the components and containers available in swing. Write a java program to design a calculator in swing frame to perform arithmetic operations addition and subtraction. Design the frame with any background color, three text boxes and two buttons (ADD and SUB). When you place values in two text boxes and press ADD or SUB button, the result of addition and subtraction of two numbers should be displayed in third text box. [5]
