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Roll No. .....

M.C.A./M.Sc. Semester I Examination 2024-25

Computer Science

CS-204: Object Oriented Programming

Time : Three hours **Max. Marks : 70**

(Write your Roll No. at the top immediately on the receipt of this question paper)

Note: Question 1 is compulsory; attempt any four questions from the remaining six questions.

1. (a) Which of the following can be used to create a new thread in Java? [1 mark]

(I) Extending the Thread class (II) Implementing the Runnable interface (III) Both (I) and (II) (IV) None of the above

(b) Which of the following classes is immutable in Java? [1 mark]

(I) StringBuffer (II) String (III) ArrayList (IV) HashMap

(c) What is the output of the following code snippet? [1 mark]

```
int x = 10;
int y = ++x * 10 + x--;
System.out.println(y);
```

(d) Which of the following statements is true about Java interfaces? [1 mark]

(I) An interface can have static methods (II) An interface can have default methods (III) An interface can have private methods (IV) All of the above

(e) In Java, which of the following exceptions is a checked exception? [1 mark]

(I) NullPointerException (II) ArrayIndexOutOfBoundsException (III) FileNotFoundException (IV) ArithmeticException

(f) What will be the output of the following code? [2 marks]

```
class Test {
    public static void main(String[] args) {
        int x = 5;
        int y = 10;
        System.out.println(x + y + " Java " + x + y);
    }
}
```

(g) What is the purpose of the `final` keyword in Java? [1 mark]

(I) To define a constant variable (II) To prevent method overriding (III) To prevent inheritance of a class (IV) All of the above

(h) Which principle of OOP allows a child class to provide a specific implementation of a method already defined in its parent class? [1 mark]

(I) Encapsulation (II) Inheritance (III) Polymorphism (IV) Overriding

(i) What happens when you use the `equals()` method for comparing two String objects in Java? [1 mark]

(I) Compares references of the strings (II) Compares content of the strings (III) Throws an exception if strings are null (IV) It is the same as the == operator

(j) What is the result of the following code? [2 marks]

```
String str = null;
System.out.println(str + "Java");
```

(k) What will be the result of the following code? [2 marks]

```
String s1 = "Java";
String s2 = new String("Java");
System.out.println(s1 == s2);
```

P.T.O.

2. (a) What is exception handling in Java? Write a program to demonstrate `try`, `catch`, `finally`, and multiple catch blocks. [7 marks]

(b) What is polymorphism in Java? Write a program that demonstrates compile-time polymorphism and runtime polymorphism. [7 marks]

3. (a) What is exception handling in Java, and how many types of exceptions exist? Illustrate your explanation with an appropriate example. [5 marks]

(b) Describe the process of exception propagation in Java with an appropriate example. [4 marks]

(c) Write a Java program to demonstrate constructor overloading and how the appropriate constructor is invoked based on the number of arguments passed during object creation. [5 marks]

4. (a) Create a Java program with a *Person* class where the *name* field is private, the *age* field is protected, and the *address* field is public. Demonstrate how each access modifier restricts or allows access within a main method. [5 marks]

(b) Write a Java program to convert a given number of seconds into hours, minutes, and seconds. [5 marks]

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(c) Write a Java program to demonstrate the differences between primitive and non-primitive data types by declaring variables of both types and performing simple operations on them. [4 marks]

5. (a) What is the Java Collections Framework? Describe its main components, such as lists, sets, maps, and queues, and explain their use with examples. [7 marks]

(b) What is event-driven programming, and how is it implemented in Java? Describe how you can handle user actions such as button clicks or key presses in a GUI application using event listeners. [7 marks]

6. (a) Write a Java program to demonstrate the difference between string literals and string objects. Create two string variables: one using a string literal and the other using the new keyword. Compare them using the == operator and explain the result. [5 marks]

(b) Write a Java program to demonstrate inheritance by creating a base class `Animal` with a method `sound()`, and two subclasses `Dog` and `Cat` that override the `sound()` method. Show how polymorphism works by calling the `sound()` method on an `Animal` reference that points to both `Dog` and `Cat` objects. [5 marks]

(c) What are the key features of the Object-Oriented concept? Explain each feature with an appropriate example. [4 marks]

7. (a) Write a Java program to demonstrate the execution order of a method, instance block, and static block in a class. The program should include:

(I) A static block that prints a message when the class is loaded.

(II) An instance block that prints a message each time an object is instantiated.

(III) A method `initialize()` that is called from the constructor and prints a message.

(IV) A constructor that calls the `initialize()` method and prints a message when an object is created.

Create multiple objects of the class and explain the execution order of the blocks and methods, both at the time of class loading and object creation. [10 marks]

(b) What are the typical scenarios where Java exceptions occur? [4 marks]