Section A: [12 Marks]

This section contains 12 multiple-choice questions, 1 mark each. All questions are mandatory.

1. What is the default value of a boolean variable in Java?

a) true

b) 1

c) false

d) null

2. What does the super keyword refer to in Java?

a) The current object

b) A static method

c) The parent class

d) A subclass constructor

3. What is the purpose of the final keyword when applied to a variable in Java?

a) It cannot be modified after initialization

b) It can only be accessed in the main method

c) It becomes accessible by all classes

d) It is used to define a constructor

4. What will be the output

```
int a = 5;
int b = 10;
System.out.println(a++ + ++b);
```

a) 15

b) 16

c) 17

d) 18

5. Which of the following allows runtime polymorphism in Java?

a) Method overloading

b) Method overriding

c) Constructor overloading

d) Static method calls

6. What will be the output of the code

```
int[] nums = {1, 2, 3, 4};
System.out.println(nums[4]);
```

a) 4

b) 0

c) ArrayIndexOutOfBoundsException

d) Compile-time error

7. Which keyword is used to define a subclass in Java?

a) inherits

b) extends

c) implements

d) inheritsFrom

8. Which concept allows a child class to provide a specific implementation of a method already defined in the parent class?

a) Method Overloading

b) Abstraction

c) Inheritance

d) Method Overriding

9. What is the output of the following code?

```
Integer num1 = new Integer(100);
Integer num2 = new Integer(100);
System.out.println(num1.equals(num2));
```

a) true

b) false

c) Compile error

d) null

10. Which loop is guaranteed to run at least once?

a) for

b) while

c) do-while

d) if

11. Which operator is used to check for equality of object references?

a) =

b) equals()

c) ==

d) !=

12.What will be the output?

```
int a = 5, b = 12;
a = a + b;
b = a - b;
a = a - b;
System.out.println("a: " + a + ", b: " + b);
```

a) a: 17, b: 5

b) a: 12, b: 5

c) a: 5, b: 12

d) a: 12, b: 17

Section B: [10 Marks]

Q1. Explain the concept of inheritance in Object-Oriented Programming. Also, list and explain the types of inheritance supported in Java with examples.

[5 Marks]

Q2. What is a Polymorphism ? Explain the type with example.

[5 Marks]

Section C: [8 Marks]

Answer any 4

1. Constructor
2. If - else
3. Interface
4. Jump Statement

Section D: [20 Marks]

Design and implement a Java program to calculate the commission for salespeople based on their type and sales performance.

- Salesperson Class:
    - String name
    - int salespersonId
    - double calculateCommission()
- FullTimeSalesperson Class (inherits from Salesperson):
    - double baseSalary
    - double salesAmount
    - double commissionRate

    - double calculateCommission()
- PartTimeSalesperson Class (inherits from Salesperson):
    - double hourlyRate
    - int hoursWorkedPerMonth
    - double calculateCommission()

2. Design and implement a Java program to calculate the fuel efficiency of different types of vehicles using interfaces.

- Vehicle Interface:
    - Method: double calculateFuelEfficiency()
- Car Class (implements Vehicle interface):
    - double distance
    - double fuelUsed
    - Implements calculateFuelEfficiency() as:
      distance / fuelUsed
- Bike Class (implements Vehicle interface):
    - double distance
    - double fuelUsed
    - Implements calculateFuelEfficiency() as:
      distance / fuelUsed

Create a main class to process a the calculation