

Name:

Start Time:

(Total time: 60 minutes)

Section 1: Multiple Choice Questions (20 marks, 1 each)

Instructions: Choose the most appropriate answer from the given options.

1. Which of the following is not a principle of object-oriented programming?
 - a) Encapsulation
 - b) Inheritance
 - c) Abstraction
 - d) Linearity

2. In Java, which keyword is used to explicitly call the superclass constructor?
 - a) super
 - b) this
 - c) extends
 - d) implements

3. What is the output of the following code?
int x = 5;
System.out.println(x++ + ++x);
 - a) 10
 - b) 11
 - c) 12
 - d) Compilation error

4. Which access modifier provides the most restrictive access level?
 - a) public
 - b) private
 - c) protected
 - d) default

5. Which of the following statements is true regarding method overloading in Java?
 - a) Overloaded methods must have the same return type.
 - b) Overloaded methods must have different method names.
 - c) Overloaded methods must have the same number of parameters.
 - d) Overloaded methods must have the same access modifier.

6. Which of the following is not a valid identifier in Java?
- a) `_myVar`
 - b) `$myVar`
 - c) `1myVar`
 - d) `my_Var`
7. What is the output of the following code?
- ```
String str = "Java";
str.concat(" Programming");
System.out.println(str);
```
- a) Java Programming
  - b) Programming
  - c) Java
  - d) Compilation error
8. Which Java keyword is used to prevent a class from being subclassed?
- a) `final`
  - b) `static`
  - c) `abstract`
  - d) `extends`
9. Which of the following is not a valid way to create a thread in Java?
- a) Implementing the `Runnable` interface
  - b) Extending the `Thread` class
  - c) Using the `start()` method of a thread object
  - d) Using the `run()` method of a thread object
10. What is the purpose of the "this" keyword in Java?
- a) It refers to the current object.
  - b) It refers to the superclass object.
  - c) It refers to the subclass object.
  - d) It refers to the static object.
11. What is the output of the following code?
- ```
int[] numbers = {1, 2, 3, 4, 5};  
System.out.println(numbers.length);
```
- a) 1
 - b) 2
 - c) 3
 - d) 5

12. Which of the following is true about interfaces in Java?
- a) An interface can be instantiated.
 - b) An interface can extend multiple interfaces.
 - c) An interface can have a constructor.
 - d) An interface can have instance variables.
13. What is the difference between method overriding and method overloading in Java?
- a) Method overriding is used for static methods, while method overloading is used for instance methods.
 - b) Method overriding occurs in the same class, while method overloading occurs in different classes.
 - c) Method overriding changes the method implementation, while method overloading changes the method signature.
 - d) Method overriding is used for private methods, while method overloading is used for public methods.
14. Which of the following statements about abstract classes in Java is true?
- a) Abstract classes can be instantiated.
 - b) Abstract classes cannot contain any abstract methods.
 - c) Abstract classes can be used to achieve multiple inheritances.
 - d) Abstract classes can only be extended but not implemented.
15. What is the purpose of the transient keyword in Java?
- a) It indicates that a variable should not be serialized.
 - b) It makes a variable thread-safe for concurrent access.
 - c) It allows a variable to be accessed by multiple threads simultaneously.
 - d) It specifies that a variable is to be stored in the CPU cache for faster access.
16. Which of the following is true about the "this" keyword in Java?
- a) It can be used in static methods.
 - b) It refers to the current instance of the class.
 - c) It is used to invoke the superclass constructor.
 - d) It can only be used within a constructor.
17. What is the difference between StringBuilder and StringBuffer in Java?
- a) StringBuilder is not thread-safe, while StringBuffer is thread-safe.
 - b) StringBuilder is immutable, while StringBuffer is mutable.
 - c) StringBuilder is synchronized, while StringBuffer is not synchronized.
 - d) StringBuilder can be used for character manipulation, while StringBuffer cannot.

18. What is the output of the following code?

```
List<Integer> numbers = new ArrayList<>();  
numbers.add(1);  
numbers.add(2);  
numbers.add(3);  
numbers.remove(1);  
System.out.println(numbers);
```

- a) [1, 3]
- b) [1, 2, 3]
- c) [2, 3]
- d) [1]

19. Which of the following is true regarding Java interfaces?

- a) Interfaces can have instance variables.
- b) Interfaces can be instantiated with the "new" keyword.
- c) Interfaces can extend multiple interfaces.
- d) Interfaces can define constructors.

20. What is the difference between a shallow copy and a deep copy in Java?

- a) Shallow copy creates a new instance with the same values, while deep copy creates a new instance with the same references.
- b) Shallow copy creates a new instance with the same references, while deep copy creates a new instance with the same values.
- c) Shallow copy is used for primitive types, while deep copy is used for reference types.
- d) Shallow copy is performed using the clone() method, while deep copy is performed using the copy() method.

Section 2: Programming Questions (45 marks, 15 each)

Instructions: Write Java code for the following programming questions. Provide the complete solution and make sure your code is error-free.

1. Write a Java program to find the sum of all prime numbers from 1 to 100 (inclusive).
2. Write a Java program to calculate the factorial of a given number (if possible use recursion).
3. Write a Java class called "Rectangle" with instance variables width and height. Implement a method called "calculateArea" that calculates and returns the area of the rectangle.