QuestionSet_Core-Java

Set 1

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Explain the four pillars of OOP with a real-world example for each. (5 Marks)

2. Discuss the advantages of using interfaces over abstract classes in Java. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write a Java class `Student` with fields `id` and `name`, implementing an interface `Printable`. (5 Marks)

2. Write code to create an object of `Student` and call the `print()` method from the interface. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the difference between an abstract class and an interface in Java? (2 Marks)

2. What is the purpose of the `try-catch` block in exception handling? (2 Marks)

3. What is a Has-a relationship, and how is it implemented in Java? (2 Marks)

4. What is the default capacity of an ArrayList in Java? (2 Marks)

5. What is the role of the `DriverManager` class in JDBC? (2 Marks)

Set 2

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Analyze the role of abstraction in reducing code complexity with an example. (5 Marks)

2. Compare the use of checked and unchecked exceptions in Java applications. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Create an abstract class `Shape` with an abstract method `calculateArea()`. (5 Marks)

2. Write a subclass `Circle` that extends `Shape` and implements `calculateArea()`. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the purpose of the `abstract` keyword in Java? (2 Marks)

2. How does the `finally` block work in exception handling? (2 Marks)

3. What is the difference between composition and aggregation in a Has-a relationship? (2 Marks)

4. What is the significance of the `synchronized` keyword in multithreading? (2 Marks)

5. What is the purpose of the `BufferedReader` class in Java I/O? (2 Marks)

Set 3

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Discuss the concept of polymorphism with examples of method overloading and overriding. (5 Marks)

2. Evaluate the impact of multithreading on application performance. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write a Java class `Animal` with an overridden method `makeSound()`. (5 Marks)

2. Write code to create and start a thread that prints numbers from 1 to 10. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is method overloading in Java? (2 Marks)

2. What is the purpose of the `throw` keyword? (2 Marks)

3. How is a Has-a relationship different from an Is-a relationship? (2 Marks)

4. What is the difference between `Thread` and `Runnable` in multithreading? (2 Marks)

5. What is the role of the `FileInputStream` class? (2 Marks)

Set 4

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Explain the concept of encapsulation with a practical Java example. (5 Marks)

2. Compare the use of ArrayList and LinkedList in the Java Collections Framework. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write a Java class `Employee` with private fields and public getter/setter methods. (5 Marks)

2. Write code to add elements to an ArrayList and iterate over them using a for-each loop. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the purpose of access modifiers in Java? (2 Marks)

2. How does the `throws` clause differ from `throw`? (2 Marks)

3. What is an example of a Has-a relationship in a real-world scenario? (2 Marks)

4. What is a deadlock in multithreading, and how can it be avoided? (2 Marks)

5. What is the difference between `Reader` and `InputStream` in Java I/O? (2 Marks)

Set 5

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Discuss the role of exception handling in improving application robustness. (5 Marks)

2. Analyze the benefits of using generics in the Java Collections Framework. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write a Java method that throws an `ArithmeticException` and handle it. (5 Marks)

2. Write code to create a generic class `Box<T>` that stores and retrieves a value. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the purpose of the `try-with-resources` statement? (2 Marks)

2. What is the role of the `extends` keyword with generics? (2 Marks)

3. How is a Has-a relationship implemented using composition? (2 Marks)

4. What is the purpose of the `yield()` method in multithreading? (2 Marks)

5. What is the role of the `FileWriter` class in Java? (2 Marks)

Set 6

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Explain the concept of inheritance with a multi-level inheritance example. (5 Marks)

2. Compare the use of HashMap and TreeMap in the Collections Framework. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write a Java class `Vehicle` and a subclass `Car` that inherits from it. (5 Marks)

2. Write code to store key-value pairs in a HashMap and print them. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the `super` keyword used for in Java? (2 Marks)

2. What is the purpose of the `catch` block? (2 Marks)

3. What is the difference between aggregation and association? (2 Marks)

4. What is the role of the `join()` method in multithreading? (2 Marks)

5. What is the purpose of the `RandomAccessFile` class? (2 Marks)

Set 7

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Discuss the role of interfaces in achieving multiple inheritance in Java. (5 Marks)

2. Evaluate the performance implications of using NIO over traditional I/O. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write an interface `Drawable` with a method `draw()`, implemented by a class `Rectangle`. (5 Marks)

2. Write code to read a file using the `Files` class from the NIO package. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the purpose of the `default` keyword in interfaces? (2 Marks)

2. What is a custom exception in Java? (2 Marks)

3. How is a Has-a relationship represented in a UML diagram? (2 Marks)

4. What is the difference between `sleep()` and `wait()` in multithreading? (2 Marks)

5. What is the role of the `Path` interface in NIO? (2 Marks)

Set 8

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Explain the concept of thread synchronization with a producer-consumer example. (5 Marks)

2. Compare the use of Set and List interfaces in the Collections Framework. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write a Java class with a synchronized method to increment a counter. (5 Marks)

2. Write code to create a HashSet and add unique elements to it. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the purpose of the `synchronized` block? (2 Marks)

2. What is the difference between `Error` and `Exception` in Java? (2 Marks)

3. What is an example of a Has-a relationship in a banking system? (2 Marks)

4. What is the role of the `notify()` method in multithreading? (2 Marks)

5. What is the purpose of the `FileChannel` class in NIO? (2 Marks)

Set 9

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Discuss the role of abstraction in designing a layered architecture. (5 Marks)

2. Analyze the benefits of using JDBC for database connectivity. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write an abstract class `BankAccount` with an abstract method `calculateInterest()`. (5 Marks)

2. Write JDBC code to connect to a database and retrieve data from a table. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the purpose of the `abstract` method? (2 Marks)

2. How does the `throwable` class relate to exceptions? (2 Marks)

3. What is the difference between composition and inheritance? (2 Marks)

4. What is the purpose of the `interrupt()` method in threads? (2 Marks)

5. What is the role of the `Connection` interface in JDBC? (2 Marks)

Set 10

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Explain the concept of generics with a type-safe example. (5 Marks)

2. Compare the use of ByteBuffer and CharBuffer in Java NIO. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write a generic method to find the maximum of two values of any type. (5 Marks)

2. Write code to write data to a file using a `ByteBuffer` in NIO. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the purpose of the `?` wildcard in generics? (2 Marks)

2. What is the role of the `finally` block in exception handling? (2 Marks)

3. How is a Has-a relationship useful in object design? (2 Marks)

4. What is the difference between `start()` and `run()` in threads? (2 Marks)

5. What is the purpose of the `Statement` interface in JDBC? (2 Marks)

Set 11

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Discuss the role of I/O streams in handling file operations. (5 Marks)

2. Evaluate the impact of exception handling on code maintainability. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write code to read a text file using `BufferedReader`. (5 Marks)

2. Write a method that throws a `FileNotFoundException` and handle it. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the purpose of the `InputStream` class? (2 Marks)

2. What is a checked exception? (2 Marks)

3. What is an example of a Has-a relationship in a car system? (2 Marks)

4. What is the role of the `wait()` method in multithreading? (2 Marks)

5. What is the role of the `ResultSet` interface in JDBC? (2 Marks)

Set 12

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Explain the concept of thread pooling with a use case. (5 Marks)

2. Compare the use of HashSet and LinkedHashSet in the Collections Framework. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write code to create a thread pool using `ExecutorService`. (5 Marks)

2. Write code to add elements to a LinkedHashSet and iterate over them. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the purpose of the `ExecutorService` class? (2 Marks)

2. What is an unchecked exception? (2 Marks)

3. How is a Has-a relationship implemented using aggregation? (2 Marks)

4. What is the difference between `notify()` and `notifyAll()`? (2 Marks)

5. What is the purpose of the `PreparedStatement` interface? (2 Marks)

Set 13

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Discuss the role of NIO selectors in non-blocking I/O operations. (5 Marks)

2. Analyze the benefits of using polymorphism in a banking application. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write code to create a `Selector` and register a channel in NIO. (5 Marks)

2. Write a Java class `Account` with a polymorphic method `withdraw()`. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the purpose of the `Selector` class in NIO? (2 Marks)

2. What is the role of the `getMessage()` method in exceptions? (2 Marks)

3. What is the difference between association and composition? (2 Marks)

4. What is the purpose of the `isAlive()` method in threads? (2 Marks)

5. What is the role of the `Driver` interface in JDBC? (2 Marks)

Set 14

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Explain the concept of collection iterators with an example. (5 Marks)

2. Compare the use of Vector and ArrayList in concurrent programming. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write code to iterate over a List using an Iterator. (5 Marks)

2. Write code to add elements to a Vector and access them. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the purpose of the `Iterator` interface? (2 Marks)

2. What is the role of the `printStackTrace()` method? (2 Marks)

3. What is an example of a Has-a relationship in an e-commerce system? (2 Marks)

4. What is the difference between `wait()` and `sleep()` in terms of locking? (2 Marks)

5. What is the purpose of the `Callable` interface in multithreading? (2 Marks)

Set 15

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Discuss the role of JDBC transactions in database operations. (5 Marks)

2. Evaluate the impact of generics on type safety in Java. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write JDBC code to perform a transaction with commit and rollback. (5 Marks)

2. Write a generic method to swap two elements in a list. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the purpose of the `commit()` method in JDBC? (2 Marks)

2. What is the role of the `super` keyword in exception handling? (2 Marks)

3. How is a Has-a relationship beneficial in software design? (2 Marks)

4. What is the purpose of the `setPriority()` method in threads? (2 Marks)

5. What is the role of the `Channels` class in NIO? (2 Marks)

Set 16

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Explain the concept of I/O buffering with an example. (5 Marks)

2. Compare the use of Queue and Deque in the Collections Framework. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write code to write data to a file using `BufferedWriter`. (5 Marks)

2. Write code to implement a Queue using `ArrayDeque` and add elements. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the purpose of the `BufferedWriter` class? (2 Marks)

2. What is the role of the `getCause()` method in exceptions? (2 Marks)

3. What is an example of a Has-a relationship in a university system? (2 Marks)

4. What is the difference between `Runnable` and `Callable`? (2 Marks)

5. What is the purpose of the `DatabaseMetaData` interface? (2 Marks)

Set 17

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Discuss the role of multithreading in improving I/O-bound applications. (5 Marks)

2. Analyze the benefits of using NIO channels for network programming. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write code to create two threads that read from the same file. (5 Marks)

2. Write code to open a channel using `FileChannel` in NIO. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the purpose of the `ThreadGroup` class? (2 Marks)

2. What is a runtime exception? (2 Marks)

3. How is a Has-a relationship different from dependency? (2 Marks)

4. What is the role of the `interrupt()` method in threads? (2 Marks)

5. What is the purpose of the `SeekableByteChannel` interface? (2 Marks)

Set 18

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Explain the concept of collection sorting with a custom comparator. (5 Marks)

2. Compare the use of HashTable and ConcurrentHashMap in multithreading. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write code to sort an ArrayList using a custom Comparator. (5 Marks)

2. Write code to add elements to a ConcurrentHashMap. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the purpose of the `Comparator` interface? (2 Marks)

2. What is the role of the `fillInStackTrace()` method? (2 Marks)

3. What is an example of a Has-a relationship in a hospital system? (2 Marks)

4. What is the difference between `daemon` and `user` threads? (2 Marks)

5. What is the purpose of the `RowSet` interface in JDBC? (2 Marks)

Set 19

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Discuss the role of abstraction in designing a database access layer. (5 Marks)

2. Evaluate the impact of NIO on scalability in server applications. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write an abstract class `Database` with an abstract method `connect()`. (5 Marks)

2. Write code to use `DatagramChannel` for UDP communication in NIO. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the purpose of the `abstract` class in design? (2 Marks)

2. What is the role of the `initCause()` method in exceptions? (2 Marks)

3. How is a Has-a relationship implemented in code? (2 Marks)

4. What is the purpose of the `getState()` method in threads? (2 Marks)

5. What is the role of the `SQLWarning` class in JDBC? (2 Marks)

Set 20

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Explain the concept of exception chaining with an example. (5 Marks)

2. Compare the use of Stack and Queue in the Collections Framework. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write code to chain two exceptions using `initCause()`. (5 Marks)

2. Write code to implement a Stack using `Stack` class and push/pop elements. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the purpose of exception chaining? (2 Marks)

2. What is the role of the `? extends` wildcard in generics? (2 Marks)

3. What is an example of a Has-a relationship in a library system? (2 Marks)

4. What is the difference between `suspend()` and `resume()` in threads? (2 Marks)

5. What is the purpose of the `Blob` interface in JDBC? (2 Marks)

Set 21

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Discuss the role of I/O streams in serializing objects. (5 Marks)

2. Analyze the benefits of using generics with collections. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write code to serialize an object using `ObjectOutputStream`. (5 Marks)

2. Write a generic method to print all elements of a collection. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the purpose of the `ObjectOutputStream` class? (2 Marks)

2. What is the role of the `getStackTrace()` method? (2 Marks)

3. How is a Has-a relationship different from inheritance? (2 Marks)

4. What is the purpose of the `setDaemon()` method? (2 Marks)

5. What is the role of the `Clob` interface in JDBC? (2 Marks)

Set 22

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Explain the concept of thread safety with a critical section example. (5 Marks)

2. Compare the use of LinkedList and ArrayDeque as a queue. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write code to implement a thread-safe counter using `synchronized`. (5 Marks)

2. Write code to use ArrayDeque as a queue and dequeue elements. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the purpose of the `volatile` keyword? (2 Marks)

2. What is the role of the `toString()` method in exceptions? (2 Marks)

3. What is an example of a Has-a relationship in a game system? (2 Marks)

4. What is the difference between `wait()` and `notify()` in terms of usage? (2 Marks)

5. What is the purpose of the `Savepoint` interface in JDBC? (2 Marks)

Set 23

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Discuss the role of NIO buffers in efficient data transfer. (5 Marks)

2. Evaluate the impact of polymorphism on code reusability. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write code to allocate and fill a `CharBuffer` in NIO. (5 Marks)

2. Write a Java class `Bird` with a polymorphic method `fly()`. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the purpose of the `Buffer` class in NIO? (2 Marks)

2. What is the role of the `getLocalizedMessage()` method? (2 Marks)

3. How is a Has-a relationship useful in a real-time system? (2 Marks)

4. What is the purpose of the `currentThread()` method? (2 Marks)

5. What is the role of the `DataSource` interface in JDBC? (2 Marks)

Set 24

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Explain the concept of collection filtering with a Stream API example. (5 Marks)

2. Compare the use of FileReader and FileInputStream for text files. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write code to filter a List using Java Streams. (5 Marks)

2. Write code to read a text file using `FileReader`. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the purpose of the `Stream` interface? (2 Marks)

2. What is the role of the `getSuppressed()` method in exceptions? (2 Marks)

3. What is an example of a Has-a relationship in a social media system? (2 Marks)

4. What is the difference between `isInterrupted()` and `interrupted()`? (2 Marks)

5. What is the purpose of the `Ref` interface in JDBC? (2 Marks)

Set 25

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Discuss the role of JDBC prepared statements in preventing SQL injection. (5 Marks)

2. Analyze the benefits of using NIO for file copying operations. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write JDBC code to execute a prepared statement for inserting data. (5 Marks)

2. Write code to copy a file using `Files.copy()` in NIO. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the purpose of the `setString()` method in prepared statements? (2 Marks)

2. What is the role of the `getClass()` method in exception handling? (2 Marks)

3. How is a Has-a relationship implemented in a design pattern? (2 Marks)

4. What is the purpose of the `getPriority()` method in threads? (2 Marks)

5. What is the role of the `Array` interface in JDBC? (2 Marks)

Below are 3 additional unique sets of questions based on Core Java, incorporating the topics of String, StringBuffer, and StringBuilder, alongside the previously covered topics (OOP, Interface, Abstraction, Exception Handling, Has-a Relationship, Multithreading, I/O, NIO, Collections, Generics, and JDBC). Each set follows the mark structure you provided: 10 marks each for Technical & Analytical (2 questions), Coding (2 questions), and QA (5 questions), totaling 30 marks per set. I've ensured these sets are unique and do not repeat questions from the previous 25 sets or among themselves, as of April 07, 2025.

Set 26

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Explain the immutability of the String class in Java and its implications for memory usage. (5 Marks)

2. Compare the performance of String, StringBuffer, and StringBuilder in a multithreaded environment. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write a Java program to concatenate two strings using the `+` operator and measure the time taken. (5 Marks)

2. Write code to append a string to a StringBuffer object and print the result. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the purpose of the `intern()` method in the String class? (2 Marks)

2. How does the `length()` method differ from `capacity()` in StringBuffer? (2 Marks)

3. What is an example of a Has-a relationship involving a String object? (2 Marks)

4. What is the role of the `join()` method in multithreading with strings? (2 Marks)

5. What is the purpose of the `substring()` method in the String class? (2 Marks)

Set 27

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Discuss the thread-safety features of StringBuffer compared to StringBuilder. (5 Marks)

2. Analyze the impact of using StringBuilder for large string manipulations in I/O operations. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write a Java program to reverse a string using StringBuilder. (5 Marks)

2. Write code to insert a substring into a StringBuffer at a specific index. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the purpose of the `replace()` method in the String class? (2 Marks)

2. How does the `ensureCapacity()` method work in StringBuffer? (2 Marks)

3. How is a Has-a relationship implemented with StringBuilder in a class? (2 Marks)

4. What is the difference between `wait()` and `sleep()` when handling string operations in threads? (2 Marks)

5. What is the role of the `trim()` method in the String class? (2 Marks)

Set 28

Section A: Technical & Analytical (10 Marks - 2 Questions)

1. Explain the concept of string pooling in Java and its effect on memory efficiency. (5 Marks)

2. Compare the use of String, StringBuffer, and StringBuilder for building SQL queries in JDBC. (5 Marks)

Section B: Coding (10 Marks - 2 Questions)

1. Write a Java program to check if a string is a palindrome using StringBuilder. (5 Marks)

2. Write JDBC code to construct a dynamic SQL query using StringBuffer and execute it. (5 Marks)

Section C: QA (10 Marks - 5 Questions)

1. What is the purpose of the `valueOf()` method in the String class? (2 Marks)

2. How does the `delete()` method differ between StringBuffer and StringBuilder? (2 Marks)

3. What is an example of a Has-a relationship using String in a logging system? (2 Marks)

4. What is the role of the `getName()` method in multithreading with string handling? (2 Marks)

5. What is the purpose of the `toLowerCase()` method in the String class? (2 Marks)
