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# Computer Programming Concepts (390)

**NATIONAL 2025**

**CONCEPT KNOWLEDGE:**

Multiple Choice (50 @ 2 points each)

\_\_\_\_\_ (100 points)

**Test Time: 60 minutes**

### Multiple Choice Questions

**Directions:** Identify the letter of the choice that best completes the statement or answers the question.

1. What is encapsulation in object-oriented programming?
  - A. The process of inheriting methods and attributes from another class
  - B. The practice of keeping classes separated and independent
  - C. The bundling of data with the methods that operate on that data
  - D. The conversion of a complex system into simpler representations
2. Consider the following SQL query: `SELECT * FROM Employees WHERE Age > 25 AND Salary > 50000`; What is the purpose of this query?
  - A. To delete employees over 25 with a salary over 50,000
  - B. To select employees over 25 with a salary over 50,000
  - C. To update the information of employees over 25 with a salary over 50,000
  - D. To insert information for employees over 25 with a salary over 50,000
3. In a flowchart, what does a diamond shape represent?
  - A. A process
  - B. An input/output operation
  - C. A decision
  - D. The start/end of the process
4. Which loop structure is best used when the number of iterations is known ahead of time?
  - A. While loop
  - B. Do-while loop
  - C. For loop
  - D. All of the above
5. In the context of arrays, what does the term "index" refer to?
  - A. The value stored at an array's position
  - B. The memory location of the first array element
  - C. The position of an element in the array
  - D. The size of the array
6. What does the term "I/O operations" refer to in programming?
  - A. Installing and Operating
  - B. Inputting and Outputting
  - C. Inner and Outer Operations
  - D. Integration and Optimization

7. Consider the following Java code snippet: `int[] arr = {1, 2, 3, 4, 5}; for (int i = 0; i < arr.length; i++) { System.out.print(arr[i] + " "); }` What is the output?
- A. 1 2 3 4
  - B. 1 2 3 4 5
  - C. 0 1 2 3 4
  - D. Error, because the syntax is incorrect
8. In SQL, what does the JOIN operation do?
- A. Combines rows from two or more tables based on a related column between them
  - B. Deletes matching rows between two tables
  - C. Updates data in one table based on conditions matched in another table
  - D. Inserts data from one table into another table
9. What is the primary purpose of pseudo code?
- A. To generate automated tests
  - B. To debug existing code
  - C. To document the logic of an algorithm in a language-independent manner
  - D. To compile code into machine language
10. What is an advantage of using structured query language (SQL)?
- A. It can only be used on one type of database system
  - B. It is a standardized language for defining and manipulating data in databases
  - C. It does not allow for complex queries to be executed
  - D. It is only suitable for small databases
11. In programming, what is a string?
- A. A sequence of characters
  - B. A type of numerical data
  - C. A collection of boolean values
  - D. An array of integers
12. Which of the following is NOT a valid way to declare an array in Java?
- A. `int arr[] = new int[5];`
  - B. `int arr[] = {1, 2, 3, 4, 5};`
  - C. `int[] arr = {1, 2, 3, 4, 5};`
  - D. `array int[] = {1, 2, 3, 4, 5};`
13. When using sequential file access in programming, what does it mean?
- A. Data can only be accessed in a pre-defined, linear sequence
  - B. Files can only be accessed by one user at a time
  - C. Data is accessed randomly
  - D. Files are automatically closed after access

14. Which UML diagram is primarily used for modeling the dynamic aspects of systems?
- A. Class Diagram
  - B. Use Case Diagram
  - C. Sequence Diagram
  - D. Activity Diagram
15. What is the result of the SQL query `SELECT COUNT(*) FROM Users WHERE Age >= 18;`?
- A. The sum of the 'Age' column for users aged 18 and older
  - B. The number of users aged 18 and older
  - C. The average age of users aged 18 and older
  - D. A list of users aged 18 and older
16. In the context of software development, what is a "loop invariant"?
- A. A condition that must be true at the beginning of every iteration of a loop
  - B. A variable that cannot be changed
  - C. A loop that executes an invariant number of times
  - D. A loop that never terminates
17. Consider the following C# code snippet: `string str = "Hello, World!"; Console.WriteLine(str.Length);` What is the output?
- A. 12
  - B. 13
  - C. The code will not compile because 'Length' is not a valid property
  - D. An error, as the correct syntax is `str.length()`
18. What does the acronym ACID stand for in the context of database transactions?
- A. Atomicity, Consistency, Isolation, Durability
  - B. Accuracy, Consistency, Integrity, Durability
  - C. Atomicity, Correctness, Isolation, Durability
  - D. Authentication, Confidentiality, Integrity, Durability
19. Which of the following is a benefit of using flowcharts in software development?
- A. They make it easier to code in multiple programming languages
  - B. They ensure that the code is bug-free
  - C. They provide a visual representation of the logic and flow of a process
  - D. They reduce the need for testing
20. In programming, what is a "linter"?
- A. A tool that finds and fixes bugs in code
  - B. A tool that optimizes code performance
  - C. A tool that automatically formats code
  - D. A tool that analyzes code for errors and coding standards

21. What is the primary purpose of normalization in databases?
- A. To reduce data redundancy and improve data integrity
  - B. To increase database security
  - C. To optimize query performance
  - D. To facilitate backup and recovery procedures
22. In Python, what does the enumerate function do when applied to a list?
- A. It sorts the list
  - B. It modifies each element of the list
  - C. It returns an iterator of tuples containing indices and values from the list
  - D. It duplicates each element of the list
23. What is a common use of the "Composite" design pattern?
- A. Managing a graphical user interface hierarchy
  - B. Encrypting and decrypting data
  - C. Balancing load across servers
  - D. Serializing objects into a database
24. Which SQL clause is used to filter the results of a query based on a condition that must be true for all grouped records?
- A. HAVING
  - B. WHERE
  - C. GROUP BY
  - D. ORDER BY
25. How do you declare a multidimensional array in Java?
- A. `int[][] multiArray = new int[3][4];`
  - B. `int multiArray[][] = new int[3, 4];`
  - C. `int multiArray = new int[3][4];`
  - D. `int[] multiArray = new int[3,4];`
26. What does the break statement do in a loop?
- A. Exits the loop
  - B. Pauses the loop execution for a specified time
  - C. Skips the rest of the code inside the loop for the current iteration
  - D. Restarts the loop from the beginning
27. In the software development process, "scrum" is:
- A. A tool for static code analysis
  - B. A framework for project management
  - C. A programming language
  - D. A database management system

28. What does "persistence" mean in the context of software applications?
- A. The characteristic of data that outlives the process that created it
  - B. The ability of an application to maintain state between executions
  - C. The capacity of an application to handle increasing workload
  - D. The resistance of software to errors and bugs
29. In a SQL database, what is a "primary key"?
- A. A key that uniquely identifies each row in a table
  - B. A key used to encrypt database contents
  - C. A key that allows fast access to rows based on column values
  - D. A duplicate key for backup purposes
30. What is "technical debt"?
- A. The cost associated with choosing an easy solution now rather than a better approach for the future
  - B. The financial debt incurred during the development of a software project
  - C. The cost of additional resources required after a project is completed
  - D. The expense of training employees on new software systems
31. Which of the following best describes "agile software development"?
- A. A method focused on quick delivery of high-quality software
  - B. A method relying on sequential development phases
  - C. A development strategy where planning is prioritized over execution
  - D. A software development model that emphasizes on minimal software documentation
32. In object-oriented programming, what is an "abstract class"?
- A. A class that cannot be instantiated and is designed to be subclassed
  - B. A class that contains only abstract methods
  - C. A class that must contain at least one abstract method
  - D. A fully implemented class that cannot be inherited
33. Consider the following JavaScript array operation: `let fruits = ["apple", "banana", "cherry"];`  
`fruits.pop();` What is the state of the fruits array after this operation?
- A. `["apple", "banana"]`
  - B. `["banana", "cherry"]`
  - C. `["apple", "banana", "cherry"]`
  - D. `["cherry"]`
34. In the context of file I/O operations, what is the main purpose of the buffer?
- A. To store data temporarily while it's being transferred from one place to another
  - B. To increase the file size for better data management
  - C. To encrypt data before writing it to a file
  - D. To create a backup copy of the file before any operation

35. What does FIFO stand for in the context of data structures?
- A. First In, First Out
  - B. Final Input, Final Output
  - C. First Input, First Operation
  - D. File Input, File Output
36. In SQL, what is the purpose of the ALTER TABLE statement?
- A. To change the data type of a column in a table
  - B. To add, delete, or modify columns in an existing table
  - C. To merge two tables into one
  - D. To delete a table from the database
37. What is the principle of "Don't Repeat Yourself" (DRY) in software development?
- A. To ensure that all code is executed at least twice for verification
  - B. To avoid the duplication of software patterns
  - C. To prevent the user from entering the same input multiple times
  - D. To compile the code multiple times to ensure reliability
38. Which diagram in UML is best suited for representing the behavior of a system during its execution?
- A. Activity Diagram
  - B. Class Diagram
  - C. Sequence Diagram
  - D. Use Case Diagram
39. In programming, what is typically the first index of an array in languages like C, Java, and Python?
- A. 0
  - B. 1
  - C. -1
  - D. The array length minus one
40. What does the SQL GROUP BY statement do?
- A. Sorts the result set in ascending or descending order
  - B. Groups rows that have the same values in specified columns into summary rows
  - C. Deletes groups of rows based on a condition
  - D. Updates groups of rows based on a condition
41. Which control structure allows a program to execute a block of code multiple times with different values each time in C++?
- A. For loop
  - B. If-else statement
  - C. Switch-case statement
  - D. Function call

42. What is a "commit" in the context of version control systems like Git?
- A. A saved change to a file or set of files
  - B. The process of transferring files from a local to a remote repository
  - C. A command to view the history of changes
  - D. A tool for merging branches
43. In a relational database, what defines the relationship between tables?
- A. Foreign keys
  - B. Primary keys
  - C. Indexes
  - D. Constraints
44. What is the main advantage of using an Integrated Development Environment (IDE) over a simple text editor for programming?
- A. It provides debugging tools and automatic code generation
  - B. It only allows programming in one specific language
  - C. It restricts the use of external libraries
  - D. It automatically corrects logical errors in the code
45. In the context of agile software development, what is a "sprint"?
- A. A short, fixed-length period where a development team works to complete a set amount of work
  - B. A meeting where the team discusses what went well and what didn't in a project
  - C. A documentation phase at the end of a project
  - D. A tool used for automated testing
46. How does "encapsulation" benefit software design?
- A. By allowing global access to all data within a program
  - B. By exposing the internal implementation details of a class
  - C. By protecting an object's data from unauthorized access and modification
  - D. By duplicating objects for backup purposes
47. Which term describes the process of converting a complex expression into a series of simpler expressions in programming?
- A. Decompile
  - B. Normalization
  - C. Refactoring
  - D. Simplification
48. What role does "inheritance" play in object-oriented programming?
- A. It allows the creation of a new class that is a duplicate of an existing class
  - B. It enables a new class to absorb the properties and behaviors of another class without rewriting
  - C. It prevents a class from being modified
  - D. It restricts a class to having only one instance



49. When designing a database, what is "normalization" primarily used to achieve?
- A. To simplify the database design
  - B. To speed up database queries
  - C. To reduce data redundancy and improve data integrity
  - D. To encrypt sensitive information
50. In software development, what is "unit testing"?
- A. Testing individual units or components of a software to validate that each unit works as expected
  - B. Testing the interaction between components of a software
  - C. Testing the software as a whole
  - D. Testing the software on different operating systems