1. What does "OOP" stand for in programming?

Answer: Object-Oriented Programming

Explanation:
OOP is a programming paradigm where the design is organized around objects rather than actions. These objects represent instances of classes that encapsulate both data (attributes) and behaviors (methods).

Lesson:
Key principles of OOP include:

- **Encapsulation:** Bundling data and methods that operate on the data together.

- **Inheritance:** Allowing classes to inherit common characteristics from a parent class.

- **Polymorphism:** Enabling objects to be treated as instances of their parent class, allowing methods to be overridden.

- **Abstraction:** Hiding complex implementation details and exposing only the necessary parts.

2. What is the primary purpose of an algorithm?

Answer: To solve a problem or perform a computation

Explanation:
An algorithm is a well-defined, step-by-step procedure or formula for solving a problem or performing a task. It acts as a blueprint for a solution that can be implemented in code.

Lesson:
Algorithms are judged on several factors:

- **Correctness:** Does the algorithm solve the problem?

- **Efficiency:** How much time and space does it require?

- **Clarity:** Is it understandable and maintainable?
  The study of algorithms also leads to the development of data structures and computational complexity theory.

3. In Python, what keyword is used to define a function?

Answer: def

Explanation:
The def keyword in Python is used to declare a function. It tells the interpreter that you're defining a new function with a specific name and a block of code.

Lesson:
Defining functions is essential for writing modular and reusable code. Understanding function scopes, arguments, and return values is key for building more complex programs and for debugging.

4. What data structure operates on a Last In, First Out (LIFO) principle?

Answer: Stack

Explanation:
A stack is a data structure where the last element added (pushed) is the first one to be removed (popped). This is often compared to a stack of plates.

Lesson:
Stacks are widely used in function call management (call stacks), undo mechanisms in software, and expression evaluation. They illustrate the importance of managing order in data processing.

5. What SQL command is used to retrieve data from a database?

Answer: SELECT

Explanation:
The SELECT statement in SQL is used to query and retrieve specific data from one or more tables in a database. It can be customized with clauses like WHERE, ORDER BY, and GROUP BY for refined queries.

Lesson:
SQL forms the backbone of relational databases. Learning SELECT queries is essential for data manipulation, reporting, and database administration, along with understanding joins, subqueries, and aggregations.

6. In Java, what is the default value of a boolean variable?

Answer: false

Explanation:
In Java, if a boolean instance variable is not explicitly initialized, its default value is false. This helps avoid undefined behavior in object states.

Lesson:
Understanding default values in Java is important for preventing bugs related to uninitialized variables. It also emphasizes the need for explicit initialization when clarity and control over variable states are required.

---

7. What does the acronym "HTML" stand for?

Answer: HyperText Markup Language

Explanation:
HTML is the standard markup language used to create and structure content on the web. It defines the structure of web pages using elements and tags.

Lesson:
HTML is foundational to web development. Along with CSS and JavaScript, it forms the basis of front-end development. Knowing HTML is crucial for understanding how web pages are built and rendered.

---

8. What is a syntax error?

Answer: A mistake in the code that violates the grammatical rules of the programming language

Explanation:
A syntax error occurs when the code written does not conform to the language's rules (its syntax), causing the compiler or interpreter to fail in parsing the code. This is often the first type of error encountered during code development.

Lesson:
Recognizing and fixing syntax errors is the first step in debugging. Understanding the grammar of a language helps in writing correct code and enhances readability and maintainability.

---

9. In C++, which operator is used to access a member of a structure through a pointer?

Answer: The arrow operator (->)

Explanation:
In C++, when you have a pointer to a structure or class, you use the -> operator to access its members. This is shorthand for dereferencing the pointer and then accessing the member using the dot operator (i.e., (*ptr).member).

Lesson:
Mastering pointer syntax in C++ is vital for efficient memory management and for working with dynamic data structures. It also lays the groundwork for understanding more advanced topics like smart pointers and memory leaks.

---

10. What is the difference between == and === in JavaScript?

Answer:

- == tests for equality after performing type coercion.
- === tests for strict equality, meaning both the value and type must be identical.

Explanation:
The == operator in JavaScript performs type conversion when comparing two values, which can lead to unexpected results. In contrast, === (strict equality) compares both the value and the data type, leading to more predictable outcomes.

Lesson:
Understanding type coercion and equality operators is crucial in JavaScript to avoid bugs, especially in conditional statements and when comparing user input. It also leads to a better grasp of JavaScript's loosely typed nature.

---

11. What does "CPU" stand for?

Answer: Central Processing Unit

Explanation:
The CPU is the primary component of a computer responsible for executing instructions and performing calculations. It is often referred to as the "brain" of the computer.

Lesson:
The CPU's architecture, including cores, cache, and clock speed, affects the overall performance of a computer. Learning about CPU operations helps in understanding system bottlenecks and optimization techniques.

---

12. What is the primary purpose of the ALU in a computer?

Answer: To perform arithmetic and logical operations

Explanation:
The Arithmetic Logic Unit (ALU) is a fundamental building block of the CPU. It handles all arithmetic (addition, subtraction, etc.) and logical (AND, OR, NOT, etc.) operations necessary for computing.

Lesson:
Understanding the ALU's role is crucial for grasping how computers process information at the most basic level. This knowledge is foundational to studying computer architecture and digital circuit design.

---

13. What kind of memory is used to store the BIOS of a computer?

Answer: Non-volatile memory (typically ROM or flash memory)

Explanation:
BIOS (Basic Input/Output System) is stored in non-volatile memory so that it persists even when the computer is powered off. Modern systems usually use flash memory for this purpose.

Lesson:
Non-volatile memory is essential for storing firmware and system-critical code. Learning about different types of memory (volatile vs. non-volatile) broadens your understanding of how computers boot and maintain system integrity.

---

14. What does the term "clock speed" refer to in a processor?

Answer: The rate at which a processor executes instructions, measured in hertz (Hz)

Explanation:
Clock speed indicates how many cycles per second a processor can perform, which often correlates with its performance. However, overall performance also depends on factors like architecture and core count.

Lesson:
While clock speed is an important performance metric, it's not the only factor. Understanding how clock speed interacts with multi-core processing, cache size, and other architectural details can lead to more effective performance optimization.

---

15. What is the primary function of cache memory?

Answer: To store frequently accessed data for quick retrieval

Explanation:
Cache memory is a small, high-speed memory located close to the CPU. Its purpose is to reduce the time it takes to access data from the main memory, thereby speeding up overall processing.

Lesson:
Cache hierarchies (L1, L2, L3) are a critical aspect of computer architecture. A well-designed cache system significantly improves the efficiency of data retrieval, emphasizing the importance of memory management in performance tuning.

---

16. What is the time complexity of the binary search algorithm?

Answer: O(log n)

Explanation:
Binary search operates on a sorted array by repeatedly dividing the search interval in half. This logarithmic time complexity means that even for very large data sets, the number of comparisons grows very slowly.

Lesson:
Understanding binary search is key to grasping logarithmic time complexity and efficient searching techniques. It also highlights the importance of sorting data before performing search operations and lays the groundwork for more advanced search algorithms.

---

17. Define polymorphism in the context of Object-Oriented Programming (OOP).

Answer: The ability of different objects to be accessed through the same interface, where each object can provide its own independent implementation

Explanation:
Polymorphism allows methods to have the same name but behave differently based on the object that calls them. This is typically achieved via method overriding in derived classes.

Lesson:
Polymorphism enhances flexibility and reusability in software design. It simplifies code maintenance and extension, and it is a cornerstone of dynamic behavior in OOP systems.

---

18. In SQL, what does the acronym "DDL" stand for, and what are its primary commands?

Answer:
DDL stands for Data Definition Language. Primary commands include:

- **CREATE:** To create new tables or databases
- **ALTER:** To modify existing structures
- **DROP:** To remove tables or databases

Explanation:
DDL commands are used for defining and managing the structure of database objects. They allow you to create, modify, or delete the schema of a database.

Lesson:
Understanding DDL is essential for database design and administration. It lays the foundation for structured data storage and management, making it a crucial part of learning SQL and relational databases.

---

19. Explain the difference between TCP and UDP protocols.

Answer:

- **TCP (Transmission Control Protocol):** Connection-oriented, reliable, and ensures ordered delivery of data.
- **UDP (User Datagram Protocol):** Connectionless, faster, but does not guarantee delivery or order.

Explanation:
TCP is used where data integrity and order are essential (e.g., web browsing, file transfers), while UDP is chosen for applications where speed is crucial and occasional data loss is acceptable (e.g., streaming, online gaming).

Lesson:
Understanding these protocols is vital in networking. They illustrate trade-offs between reliability and speed. This knowledge is useful when designing network applications and optimizing data transmission.

---

20. In web development, what is the primary function of the Document Object Model (DOM)?

Answer: To represent and allow manipulation of the structure of a webpage

Explanation:
The DOM is an interface that represents HTML or XML documents as a tree structure, where each node is an object representing a part of the document. This allows scripts (usually JavaScript) to update the content, structure, and style dynamically.

Lesson:
Learning the DOM is fundamental for interactive web development. It bridges the gap between static HTML content and dynamic user interactions, paving the way for modern web applications and single-page applications (SPAs).

---

21. What does the term "Big O Notation" refer to in computer science?

Answer: A mathematical notation that describes the upper bound of an algorithm's running time or space requirements

Explanation:
Big O Notation abstracts away constants and lower-order terms to provide a high-level understanding of an algorithm's efficiency, especially its worst-case scenario behavior.

Lesson:
Mastering Big O Notation is crucial for comparing algorithms and making informed decisions about algorithm design. It's a cornerstone of computational complexity theory and helps in optimizing software performance.

22. Name the sorting algorithm that has an average-case time complexity of O(n log n).

Answer: Merge Sort (Quick Sort also typically qualifies)

Explanation:
Merge Sort consistently runs in O(n log n) time even in the worst case, making it predictable and stable for sorting. Quick Sort, while having an average-case of O(n log n), can degrade to $O(n^2)$ in the worst case if not implemented with proper pivot selection.

Lesson:
Studying sorting algorithms provides insight into algorithm efficiency and data organization. These concepts are fundamental for both theoretical computer science and practical programming challenges.

23. What is the purpose of a foreign key in a relational database?

Answer: To establish and enforce a relationship between data in two tables

Explanation:
A foreign key is a column or a set of columns in one table that uniquely identifies a row of another table. It ensures referential integrity by linking records across tables.

Lesson:
Understanding foreign keys is crucial for database normalization and integrity. They help maintain consistent relationships among data, which is key for scalable and reliable database design.

24. How do you declare a constant variable in JavaScript?

Answer: Using the const keyword

Explanation:
The const keyword declares a block-scoped variable that cannot be reassigned after its initial assignment. This is useful for values that should remain constant throughout the execution of the program.

Lesson:
Learning about variable declarations (var, let, and

const) is essential for writing clean, predictable JavaScript. It enforces immutability where appropriate, leading to fewer bugs and more maintainable code.

25. Describe the concept of inheritance in OOP.

Answer: Inheritance is the mechanism by which one class (child) can acquire the properties and methods of another class (parent).

Explanation:
Inheritance allows new classes to reuse, extend, and modify behaviors defined in existing classes. This promotes code reuse and helps organize programs into hierarchies.

Lesson:
Inheritance is a core concept in OOP that facilitates modular design and reduces redundancy. It also enables polymorphism, where objects of different classes can be treated uniformly based on their common superclass.

26. What is the difference between "synchronous" and "asynchronous" programming?

Answer:

- **Synchronous programming:** Executes tasks sequentially, blocking subsequent operations until the current task is completed.

- **Asynchronous programming:** Allows tasks to run concurrently, enabling the program to continue processing other tasks without waiting.

Explanation:
Synchronous code waits for each operation to complete before moving to the next, which can lead to delays in I/O-bound or long-running tasks. Asynchronous programming uses callbacks, promises, or async/await patterns to improve responsiveness and performance.

Lesson:
This concept is key in modern programming, especially in environments like JavaScript and Python where I/O operations (network requests, file operations) can benefit from asynchronous

execution. It helps build more efficient and user-responsive applications.

---

27. What is the primary function of the operating system kernel?

Answer: To manage system resources and facilitate communication between hardware and software

Explanation:
The kernel is the core component of an operating system. It handles process management, memory allocation, device drivers, and system calls, ensuring that applications can interact with the hardware safely and efficiently.

Lesson:
Understanding the kernel's role is fundamental for grasping how operating systems work. It also lays the groundwork for advanced topics like concurrency, process scheduling, and system security.

---

28. Explain the concept of "hashing" in data structures.

Answer: Hashing is the process of converting input data into a fixed-size numerical value (hash code) using a hash function.

Explanation:
Hash functions are used to map data of arbitrary size to fixed-size values, which are then used as indexes in hash tables. Good hashing minimizes collisions, ensuring quick data retrieval.

Lesson:
Hashing is critical for designing efficient data structures like hash tables, which enable near-constant time complexity for lookup, insert, and delete operations. It's also fundamental in cryptography and data integrity checks.

---

29. In Python, what is the difference between a list and a tuple?

Answer:

- **List:** Mutable (modifiable) and dynamic.
- **Tuple:** Immutable (cannot be changed after creation) and often used for fixed collections of items.

Explanation:
Lists allow changes such as adding, removing, or updating elements, making them versatile for dynamic data handling. Tuples, on the other hand, are immutable, which can be beneficial for data that should not change and can be used as keys in dictionaries (if all elements are hashable).

Lesson:
Choosing between lists and tuples depends on the needs of your application. Understanding mutability is essential for avoiding unintended side effects and for optimizing memory and performance.

---

30. What is a "deadlock" in the context of operating systems?

Answer: A deadlock is a situation where two or more processes are each waiting for the other to release a resource, causing all processes to halt indefinitely.

Explanation:
Deadlocks occur in concurrent systems when processes hold resources while waiting for others. Common strategies to deal with deadlocks include resource ordering, timeouts, and deadlock detection algorithms.

Lesson:
Deadlock management is a crucial topic in operating systems and concurrent programming. Learning how to design systems to prevent, detect, and resolve deadlocks is essential for creating robust multi-threaded and multi-process applications.

---

1. Data Structures and Algorithms

1.1

Question:
A data structure that maintains a linear relationship among its elements is called a linear data structure. The data is arranged linearly, but in memory the arrangement may not be sequential. Which of the following is an exception?

- **a. Arrays**
- **b. Linked List**
- **c. Stacks**

- **d. Trees**

Correct Answer: d. Trees

Explanation:
Arrays, linked lists, and stacks are considered linear data structures because their elements are arranged in a single sequence. Trees, however, have a hierarchical (nonlinear) structure.

Lesson:

- **Arrays:** Although stored contiguously in memory, they maintain a linear order.

- **Linked Lists:** Even if nodes are scattered in memory, the pointers link them in a sequential (linear) manner.

- **Stacks:** Operate in a Last In, First Out (LIFO) order, reflecting a linear processing of data.

- **Trees:** Organize data hierarchically (with branches and nodes) and are not linear.

1.2

Question:
Accessing each data item exactly once in a structure (for instance, printing every student's name) is an operation called:

- **a. Traversing**

- **b. Searching**

- **c. Inserting**

- **d. Sorting**

Correct Answer: a. Traversing

Explanation:
Traversing means visiting every element of a data structure exactly once, which is key for operations such as printing or processing each element.

Lesson:

- **Searching:** Involves locating a specific element, not visiting all elements.

- **Inserting:** Refers to adding an element into the structure, not accessing every element.

- **Sorting:** Rearranges the order of elements rather than simply processing each one.

1.3

Question:
Which algorithm design technique works by breaking a problem into independent, smaller subproblems, solving them recursively, and combining their solutions?

- **a. Divide and Conquer**

- **b. Back Tracking Method**

- **c. Dynamic Programming**

- **d. None of the above**

Correct Answer: a. Divide and Conquer

Explanation:
Divide and Conquer splits a problem into independent subproblems, solves each recursively, and then combines the results. This method is used in algorithms like Merge Sort and Quick Sort.

Lesson:

- **Back Tracking:** Explores possible solutions incrementally, but subproblems are not solved independently—they require reverting (backtracking) when a path fails.

- **Dynamic Programming:** Addresses overlapping subproblems with memoization; here, subproblems are interdependent rather than independent.

- **None of the above:** Incorrect because Divide and Conquer is precisely the technique described.

---

2. Logic Design and Switching Theory

2.1

Question:
Which 2-input logic gate outputs a LOW signal when both inputs are HIGH and outputs HIGH otherwise?

- **a. AND**

- **b. OR**

- **c. NAND**

- **d. NOR**

Correct Answer: c. NAND

Explanation:
A NAND gate produces a LOW output only when

both inputs are HIGH; for all other input combinations, it outputs HIGH.

Lesson:

- **AND:** Outputs HIGH only if both inputs are HIGH (the opposite behavior).

- **OR:** Outputs HIGH if at least one input is HIGH.

- **NOR:** Outputs HIGH only when both inputs are LOW, making its behavior distinct from NAND.

2.2

Question:
Given several 8-bit binary numbers, which one is odd (i.e., its least significant bit is 1)?

- **a. 10101010**

- **b. 01010101**

- **c. 11001010**

- **d. 00111100**

Correct Answer: b. 01010101

Explanation:
A binary number is odd if its least significant bit (LSB) is 1. Option b ends in 1, while the others end in 0.

Lesson:

- **a, c, d:** All these numbers have a final bit of 0, indicating they are even.

- The key concept here is that the LSB in binary determines parity—1 for odd, 0 for even.

2.3

Question:
Which of the following is NOT a valid octal number (octal digits range from 0 to 7)?

- **a. 10101010**

- **b. 10824362**

- **c. 34710235**

- **d. 12312312**

Correct Answer: b. 10824362

Explanation:
Octal numbers can only include digits 0–7. Option b contains an 8, which is not allowed in octal notation.

Lesson:

- **a, c, d:** All contain digits exclusively in the range 0–7, making them valid octal numbers.

- Understanding numeral systems is essential when dealing with different bases, such as binary (base-2), octal (base-8), and hexadecimal (base-16).

---

3. Computer Systems Architecture and Organization

3.1

Question:
An 8-bit microprocessor uses 2's complement representation. How is decimal –19 represented in binary?

- **a. 11101100**

- **b. 11101101**

- **c. 11101110**

- **d. 11101111**

Correct Answer: b. 11101101

Explanation:
To represent –19: write +19 in binary (00010011), invert the bits (11101100), and add 1 to get 11101101.

Lesson:

- **a. 11101100:** This is the one's complement of 00010011 (inversion only), not the final 2's complement.

- **c. 11101110** and **d. 11101111:** Both are off by one or more from the correct two's complement calculation.

- Two's complement is the standard method for representing negative numbers in binary.

3.2

Question:
For the SAP-2 computer, when executing a Rotate the Accumulator Right (RAR) on hexadecimal 2C, what is the new value?

- **a. 16**
- **b. 58**
- **c. C2**
- **d. CE**

Correct Answer: a. 16

Explanation:
Hex 2C converts to binary 0010 1100. Rotating right moves the least significant bit to the most significant position. With the LSB being 0, the result becomes 0001 0110, which is 16 in hexadecimal.

Lesson:

- **b. 58, c. C2, d. CE:** These values result from misinterpreting the rotation operation or shifting incorrectly.
- A clear understanding of bitwise operations like rotation and shifting is vital in low-level programming.

3.3

Question:
A clock generator produces a rectangular signal with a high period of 375 µs and a low period of 125 µs. What is the duty cycle?

- **a. 25%**
- **b. 50%**
- **c. 75%**
- **d. 100%**

Correct Answer: c. 75%

Explanation:
Duty cycle = (High time ÷ Total period) × 100
= (375 µs ÷ (375 µs + 125 µs)) × 100 = 75%.

Lesson:

- **a. 25%:** Would be the percentage of the low time relative to the total period.
- **b. 50%:** Indicates equal high and low periods, which isn't the case here.

- **d. 100%:** Represents a continuous high signal, not applicable here.

---

4. Microprocessor Systems

4.1

Question:
In which year was the Intel 4004, the world's first microprocessor, introduced?

- **a. 1970**
- **b. 1971**
- **c. 1972**
- **d. 1973**

Correct Answer: b. 1971

Explanation:
The Intel 4004 was introduced in 1971, marking the start of the microprocessor era.

Lesson:

- **a. 1970, c. 1972, d. 1973:** These dates are close but incorrect based on historical records.
- Familiarity with computing history helps understand the evolution of modern hardware.

4.2

Question:
The Intel Core i7-8705G has 4 cores, 8 threads, and a maximum frequency of 4.10 GHz. To which generation does it belong?

- **a. 1st Generation**
- **b. 5th Generation**
- **c. 7th Generation**
- **d. 8th Generation**

Correct Answer: d. 8th Generation

Explanation:
Intel's naming convention shows that i7-8705G is part of the 8th Generation of Intel Core processors.

Lesson:

- **a. 1st Generation:** Far too early in Intel's timeline.

- **b. 5th Generation and c. 7th Generation:** Though plausible numbers, the model number indicates the 8th Generation.

- Recognizing naming patterns in processor model numbers aids in identifying their generation.

4.3

Question:
Which flag in a microprocessor is set when the result of an arithmetic or logical operation has an even number of 1's, and reset otherwise?

- **a. Carry Flag**
- **b. Zero Flag**
- **c. Sign Flag**
- **d. Parity Flag**

Correct Answer: d. Parity Flag

Explanation:
The parity flag is specifically used to indicate whether the number of 1 bits in the result is even (flag set) or odd (flag reset).

Lesson:

- **a. Carry Flag:** Indicates an overflow from an arithmetic operation.

- **b. Zero Flag:** Shows whether the result is zero.

- **c. Sign Flag:** Reflects the sign (positive/negative) of the result.

- Understanding each flag's purpose is essential for low-level programming and debugging.

---

5. Engineering Ethics and Computer Laws

5.1

Question:
Which law streamlines administrative procedures for registering patents, trademarks, and copyrights and protects the rights of creators?

- **a. Intellectual Property Code of the Philippines (RA 8293)**
- **b. Optical Media Act Of 2003 (RA 9239)**
- **c. Data Privacy Act Of 2012 (RA 10173)**
- **d. Cybercrime Prevention Act of 2012 (RA 10175)**

Correct Answer: a. Intellectual Property Code of the Philippines (RA 8293)

Explanation:
RA 8293 is designed to secure and protect intellectual property rights and facilitate technology transfer.

Lesson:

- **b. Optical Media Act:** Pertains to the regulation of optical media, not IP rights.

- **c. Data Privacy Act:** Focuses on personal data protection rather than intellectual property.

- **d. Cybercrime Prevention Act:** Addresses crimes involving computers and networks—not intellectual property.

5.2

Question:
Under the Data Privacy Act of 2012, information generated within protected relationships (e.g., attorney–client) is classified as:

- **a. Personal Information**
- **b. Sensitive Personal Information**
- **c. Privileged Information**
- **d. All of the above**

Correct Answer: c. Privileged Information

Explanation:
Information arising from protected relationships is regarded as privileged, meaning it must remain confidential by law.

Lesson:

- **a. Personal Information:** A broader term that includes all data identifying an individual; it does not capture the special confidentiality required here.

- **b. Sensitive Personal Information:** While sensitive data is given extra protection, the context of protected relationships is best defined as privileged.

- **d. All of the above:** Incorrect because only "privileged" accurately addresses the legal nuance.

5.3

Question:
Which data privacy principle states that information processing should be adequate, relevant, suitable, necessary, and not excessive relative to its purpose?

- **a. Principle of Transparency**

- **b. Principle of Legitimate Purpose**

- **c. Principle of Proportionality**

- **d. None of the Above**

Correct Answer: c. Principle of Proportionality

Explanation:
The Principle of Proportionality requires that the extent of data processing must match the declared purpose without exceeding what is necessary.

Lesson:

- **a. Transparency:** Involves openness about how data is processed, not the extent of processing.

- **b. Legitimate Purpose:** Ensures that data is processed only for lawful reasons, but it does not address the "amount" or "scope" of processing.

- **d. None of the Above:** Incorrect because proportionality is the correct principle.

---

6. Operating Systems

6.1

Question:
Which of the following is NOT a function of an operating system?

- **a. Memory Management**

- **b. Processor Management**

- **c. Device Management**

- **d. Threat / Virus Management**

Correct Answer: d. Threat / Virus Management

Explanation:
Operating systems are responsible for managing hardware resources (memory, processor, devices) but do not directly manage threats or viruses— that's the role of dedicated security software.

Lesson:

- **a. Memory Management, b. Processor Management, c. Device Management:** These are core OS functions essential for system stability and efficiency.

- **d. Threat/Virus Management:** Falls under cybersecurity solutions rather than the OS itself.

6.2

Question:
Memory management that involves an array of words or bytes where each has its own address refers to:

- **a. Primary Memory**

- **b. Virtual Memory**

- **c. Hard Disk**

- **d. Read-Only Memory**

Correct Answer: a. Primary Memory

Explanation:
Primary memory (RAM) is organized with individual addresses for words or bytes, allowing direct access.

Lesson:

- **b. Virtual Memory:** Refers to a memory management technique that uses secondary storage to extend RAM.

- **c. Hard Disk:** Is secondary storage and does not offer word-level addressing in the same way.

- **d. Read-Only Memory:** Typically holds firmware and isn't used for dynamic addressable storage.

6.3

Question:
Which operating system type uses a technique that shares processor time among multiple users simultaneously (enabling interactive use from various terminals)?

- **a. Batch Operating System**
- **b. Time-Sharing Operating System**
- **c. Distributed Operating System**
- **d. Network Operating System**

Correct Answer: b. Time-Sharing Operating System

Explanation:
Time-sharing systems divide the processor's time among several users so that they can interact with the computer concurrently.

Lesson:

- **a. Batch Operating System:** Processes tasks in groups without interactive use.
- **c. Distributed Operating System:** Involves multiple computers working together but is not specifically about sharing a single processor's time among users.
- **d. Network Operating System:** Focuses on managing network resources rather than direct multi-user processor sharing.

7. Computer Networks

7.1

Question:
What does ISP stand for?

- **a. Internet Service Presenter**
- **b. Internet Service Provider**
- **c. Internet Service Provider** *(duplicate)*
- **d. International Service Presenter*

Correct Answer: b. Internet Service Provider

Explanation:
ISP stands for Internet Service Provider, the entity that offers connectivity and related services to users.

Lesson:

- **a. Internet Service Presenter & d. International Service Presenter:** These are incorrect due to improper terminology.
- The duplicate option (c) reinforces the correct term but does not alter the answer.

7.2

Question:
What does EBCDIC stand for?

- **a. Extended Binary Coded Decimal Interchange Code**
- **b. Extended Bit Code Decimal Interchange Code**
- **c. Extended Bit Case Decimal Interchange Code**
- **d. Extended Binary Case Decimal Interchange Code**

Correct Answer: a. Extended Binary Coded Decimal Interchange Code

Explanation:
EBCDIC is the full form of "Extended Binary Coded Decimal Interchange Code," a character encoding system developed by IBM.

Lesson:

- **b, c, d:** These options contain variations ("Bit Code," "Bit Case," "Binary Case") that are not correct.
- Correct naming is crucial in technical terms, and small changes in wording can lead to an incorrect interpretation.

7.3

Question:
In the OSI model, at which layer does the interface to the end user reside—supporting services like Email and file transfer?

- **a. Physical Layer**
- **b. Transport Layer**
- **c. Presentation Layer**
- **d. Application Layer**

Correct Answer: d. Application Layer

Explanation:
The Application Layer is the topmost OSI layer and is where end-user applications and network services (like Email and file transfer) operate.

Lesson:

- **a. Physical Layer:** Deals with the transmission of raw bits over a physical medium.

- **b. Transport Layer:** Focuses on reliable data transfer between systems.

- **c. Presentation Layer:** Manages data representation and encryption but does not provide direct user services.

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8. Software Engineering

8.1

Question:
Based on software classification, which does not belong to the group?

- **a. Operating Systems**

- **b. Microsoft Office**

- **c. Adobe Photoshop**

- **d. Safari**

Correct Answer: a. Operating Systems

Explanation:
Operating systems are system software, while Microsoft Office, Adobe Photoshop, and Safari are application software used for productivity, creative tasks, and browsing, respectively.

Lesson:

- **b. Microsoft Office, c. Adobe Photoshop, d. Safari:** All three are end-user applications.

- Distinguishing between system software (which manages hardware) and application software (which performs specific tasks for users) is key.

8.2

Question:
Which type of software test is designed solely by examining input/output values with no knowledge of internal code?

- **a. Black Box Testing**

- **b. White Box Testing**

- **c. Acceptance Testing**

- **d. Performance Testing**

Correct Answer: a. Black Box Testing

Explanation:
Black Box Testing focuses on the functionality of an application without any knowledge of its internal workings.

Lesson:

- **b. White Box Testing:** Requires knowledge of the internal code structure.

- **c. Acceptance Testing:** Is performed by end-users to validate requirements, not strictly on input/output analysis.

- **d. Performance Testing:** Assesses speed and responsiveness rather than functional correctness.

8.3

Question:
Which testing methodology primarily focuses on checking module interfaces and parameter passing when modules interact?

- **a. Unit Testing**

- **b. Integration Testing**

- **c. System Testing**

- **d. Performance Testing**

Correct Answer: b. Integration Testing

Explanation:
Integration Testing verifies that multiple modules work together correctly, particularly focusing on their interfaces and data exchange.

Lesson:

- **a. Unit Testing:** Tests individual modules in isolation.

- **c. System Testing:** Evaluates the complete integrated system's behavior.

- **d. Performance Testing:** Measures system performance metrics rather than module interactions.

---

9. General Information

9.1

Question:
What type of malware restricts access to your computer or files and demands payment to restore access (using cryptoviral extortion)?

- **a. Spam**
- **b. Trojan**
- **c. Worm**
- **d. Ransomware**

Correct Answer: d. Ransomware

Explanation:
Ransomware encrypts files or locks systems and then demands payment (ransom) to restore access.

Lesson:

- **a. Spam:** Refers to unsolicited messages and is not malware that locks or encrypts files.
- **b. Trojan:** Although a type of malware, it disguises itself as legitimate software rather than engaging in extortion.
- **c. Worm:** Self-replicates and spreads but does not typically lock or encrypt files.

9.2

Question:
Which law criminalizes computer crimes in the Philippines?

- **a. Data Privacy Act of 2012**
- **b. Electronic Commerce Act of 2000**
- **c. Cybercrime Prevention Act of 2012**
- **d. Freedom of Information**

Correct Answer: c. Cybercrime Prevention Act of 2012

Explanation:
The Cybercrime Prevention Act of 2012 specifically addresses and criminalizes offenses related to computer and internet crimes.

Lesson:

- **a. Data Privacy Act:** Deals with personal data protection rather than criminalizing cybercrimes.
- **b. Electronic Commerce Act:** Focuses on the regulation of online commercial transactions.
- **d. Freedom of Information:** Pertains to government transparency, not cybercrime.

9.3

Question:
If a system is infected by malware using a key logger to capture keystrokes, which information security property is being attacked?

- **a. Integrity**
- **b. Privacy**
- **c. Availability**
- **d. Confidentiality**

Correct Answer: d. Confidentiality

Explanation:
Keylogging captures sensitive data such as passwords and personal information, thereby breaching confidentiality.

Lesson:

- **a. Integrity:** Relates to the accuracy and trustworthiness of data.
- **b. Privacy:** While close in concept, in technical terms confidentiality specifically addresses unauthorized data disclosure.
- **c. Availability:** Ensures data and services are accessible when needed, which is not the focus here.

Clincher Questions

C.1

Question:
The Love Bug (ILOVEYOU Virus) spread via email on

May 5, 2000. What was the subject line of the email?

- **a. Your Computer is Under Attack!**
- **b. ILOVEYOU**
- **c. CLICK ME**
- **d. Open My Message**

Correct Answer: b. ILOVEYOU

Explanation:
The email subject line was simply "ILOVEYOU," which became infamous worldwide.

Lesson:

- **a, c, d:** These alternatives are plausible-sounding but are not historically accurate.
- Familiarity with notable cyber incidents helps in recalling specific details.

C.2

Question:
Who developed the C programming language?

- **a. Guido van Rossum**
- **b. James Gosling**
- **c. Dennis Ritchie**
- **d. Bjarne Stroustrup**

Correct Answer: c. Dennis Ritchie

Explanation:
Dennis Ritchie is credited with developing C, which laid the foundation for many modern programming languages.

Lesson:

- **a. Guido van Rossum:** Creator of Python.
- **b. James Gosling:** Developed Java.
- **d. Bjarne Stroustrup:** Known for creating C++.
- Recognizing contributions by key figures helps prevent mix-ups.

C.3

Question:
Which ransomware emerged in September 2019, infecting and encrypting Windows machines, notably affecting sectors like healthcare?

- **a. Cryptolocker**
- **b. MedusaLocker**
- **c. BitPaymer**
- **d. WannaCry**

Correct Answer: b. MedusaLocker

Explanation:
MedusaLocker is the ransomware reported to have first appeared in September 2019. The other options surfaced in different time frames.

Lesson:

- **a. Cryptolocker:** Emerged around 2013.
- **c. BitPaymer:** Although active in ransomware attacks, it is not the one first reported in September 2019.
- **d. WannaCry:** Caused a global outbreak in 2017.
- Keeping track of ransomware evolution is key to understanding recent cybersecurity trends.

---

1. Data Structure Following FIFO

Question:
What is the term for a data structure that follows the First-In-First-Out (FIFO) principle, where the first element added is the first one to be removed?
Options:
A) Stack
B) Queue
C) Hash Table
D) Binary Search Tree

Correct Answer: B) Queue

Explanation:
A Queue is designed so that elements are removed in the same order they are added—first in, first out.

Lesson:

- **A) Stack:** Implements Last-In-First-Out (LIFO), not FIFO.

- **C) Hash Table:** Is used for key–value mapping and does not maintain insertion order.
- **D) Binary Search Tree:** Organizes data hierarchically for sorted access rather than strict sequential removal.

---

2. Logic Gate That Outputs True Only When Both Inputs Are True

Question:
Which logic gate outputs true only when both of its inputs are true?
Options:
A) OR Gate
B) AND Gate
C) XOR Gate
D) NOR Gate

Correct Answer: B) AND Gate

Explanation:
An AND gate produces a true output only when every input is true.

Lesson:

- **A) OR Gate:** Outputs true if at least one input is true.
- **C) XOR Gate:** Outputs true when exactly one input is true (i.e. inputs differ).
- **D) NOR Gate:** Outputs true only when all inputs are false, which is the inverse of OR.

---

3. Component for Arithmetic and Logical Operations

Question:
In computer systems, which component is responsible for performing arithmetic and logical operations?
Options:
A) Control Unit
B) Arithmetic Logic Unit (ALU)
C) Memory
D) Input/Output Controller

Correct Answer: B) Arithmetic Logic Unit (ALU)

Explanation:
The ALU is specifically designed to perform arithmetic (addition, subtraction, etc.) and logical (AND, OR, etc.) operations.

Lesson:

- **A) Control Unit:** Directs the operation of the processor but does not perform calculations.
- **C) Memory:** Stores data and instructions but does not execute operations.
- **D) Input/Output Controller:** Manages data transfer to and from peripherals, not arithmetic operations.

---

4. Primary Function of a Microprocessor

Question:
What is the primary function of a microprocessor in a computer system?
Options:
A) Store data
B) Perform calculations
C) Display graphics
D) Manage input/output devices

Correct Answer: B) Perform calculations

Explanation:
The microprocessor is the central processing unit (CPU) that performs computations and executes instructions.

Lesson:

- **A) Store data:** Is the role of memory, not the microprocessor.
- **C) Display graphics:** Is handled by graphics processing units (GPUs) or dedicated hardware.
- **D) Manage input/output devices:** Typically handled by controllers and the operating system.

---

5. Principle of Engineering Ethics Emphasizing Public Safety

Question:
Which principle of engineering ethics emphasizes the importance of ensuring public safety and welfare in engineering practices?
Options:
A) Professional Integrity

B) Social Responsibility
C) Confidentiality
D) Environmental Sustainability

Correct Answer: B) Social Responsibility

Explanation:
Social Responsibility stresses that engineers must prioritize public welfare and safety in their work.

Lesson:

- **A) Professional Integrity:** Focuses on honesty and accountability but is not solely about public safety.

- **C) Confidentiality:** Involves protecting sensitive information rather than public welfare.

- **D) Environmental Sustainability:** Focuses on environmental impact, which is related but distinct from overall public safety.

---

6. Primary Function of an Operating System

Question:
What is the primary function of an operating system (OS)?
Options:
A) To perform calculations
B) To manage hardware and software resources
C) To create web applications
D) To design graphics

Correct Answer: B) To manage hardware and software resources

Explanation:
An OS acts as an intermediary between hardware and application software, managing resources like memory, processes, and peripherals.

Lesson:

- **A) To perform calculations:** Is the role of the CPU.

- **C) To create web applications:** Is a task for developers using application software, not the OS.

- **D) To design graphics:** Falls under specialized software (graphics editors) and not the core function of an OS.

---

7. Primary Function of a Router

Question:
What is the primary function of a router in a computer network?
Options:
A) To connect multiple devices within the same network
B) To forward data packets between different networks
C) To provide wireless connectivity
D) To store data for backup purposes

Correct Answer: B) To forward data packets between different networks

Explanation:
Routers direct data between separate networks, making it possible for different networks to communicate.

Lesson:

- **A) To connect multiple devices within the same network:** Typically done by switches or hubs.

- **C) To provide wireless connectivity:** Is the function of a wireless access point.

- **D) To store data for backup purposes:** Is handled by dedicated storage solutions, not routers.

---

8. Main Purpose of Systems Analysis

Question:
What is the main purpose of systems analysis in the development process?
Options:
A) To write code for the software
B) To evaluate and understand user requirements
C) To test the final product
D) To market the product to users

Correct Answer: B) To evaluate and understand user requirements

Explanation:
Systems analysis is focused on understanding user needs and system requirements before design and implementation.

Lesson:

- **A) To write code for the software:** Is the role of programming and development.

- **C) To test the final product:** Falls under quality assurance and testing.

- **D) To market the product to users:** Is a function of marketing and business strategy.

---

9. Focus of Software Engineering

Question:
What does software engineering primarily focus on?
Options:
A) Writing novels
B) Building and maintaining software applications
C) Designing buildings
D) Creating hardware components

Correct Answer: B) Building and maintaining software applications

Explanation:
Software engineering is the systematic application of engineering principles to the development and maintenance of software.

Lesson:

- **A) Writing novels:** Is a creative writing task.

- **C) Designing buildings:** Falls under architectural engineering.

- **D) Creating hardware components:** Is the domain of electrical or computer engineering.

Average Level Questions

1. Sorting Algorithm That Merges Sorted Halves

Question:
Which sorting algorithm repeatedly divides the array in half, recursively sorts the halves, and then merges them back together?
Options:
A) Quick Sort
B) Bubble Sort
C) Merge Sort
D) Insertion Sort

Correct Answer: C) Merge Sort

Explanation:
Merge Sort divides the array into halves, recursively sorts each half, and merges them to produce a sorted array.

Lesson:

- **A) Quick Sort:** Uses a pivot-based partitioning method rather than merging halves.

- **B) Bubble Sort:** Iteratively swaps adjacent elements and is much less efficient.

- **D) Insertion Sort:** Inserts elements into a sorted portion but does not divide and merge.

---

2. Minimum Grouping in Karnaugh Maps

Question:
In Karnaugh Maps (K-Maps), what is the minimum number of cells that can be grouped together to form a valid simplification?
Options:
A) 1
B) 2
C) 4
D) 3

Correct Answer: B) 2

Explanation:
For effective simplification, cells in a K-map are typically grouped in powers of 2 (i.e. 2, 4, 8, ...). Although a single cell can represent a term, grouping starts at 2 to eliminate one or more variables.

Lesson:

- **A) 1:** While a lone 1 can be noted, it does not simplify the expression.

- **C) 4:** Is a valid grouping but not the minimum required.

- **D) 3:** Is not a power of 2 and thus is not allowed.

---

3. Cache Memory – Spatial Locality

Question:
In the context of cache memory, what is the term for the technique that places new data in cache based on the assumption that nearby data will be accessed soon?
Options:

A) Temporal Locality
B) Spatial Locality
C) Random Replacement
D) Least Recently Used (LRU)

Correct Answer: B) Spatial Locality

Explanation:
Spatial Locality is the principle that data elements close to each other in memory tend to be accessed together.

Lesson:

- **A) Temporal Locality:** Refers to accessing the same data repeatedly within a short time span.

- **C) Random Replacement:** Is a cache replacement policy with no assumption about data location.

- **D) LRU:** Is a strategy to replace the least recently used data, not based on physical proximity.

4. Bus Type Connecting CPU and Main Memory

Question:
Which of the following bus types connects the CPU to the main memory in a microprocessor system?
Options:
A) Data Bus
B) Address Bus
C) Control Bus
D) I/O Bus

Correct Answer: A) Data Bus

Explanation:
The Data Bus is responsible for transferring the actual data between the CPU and the main memory.

Lesson:

- **B) Address Bus:** Carries memory addresses, not the data itself.

- **C) Control Bus:** Transmits control signals but does not move data.

- **D) I/O Bus:** Connects peripheral devices rather than the CPU and main memory.

5. Data Privacy Act of 2012 in the Philippines

Question:
In the Philippines, what does the Data Privacy Act of 2012 primarily aim to protect?
Options:
A) Intellectual property rights
B) Personal information of individuals
C) Freedom of expression on social media
D) Trade secrets of corporations

Correct Answer: B) Personal information of individuals

Explanation:
The Data Privacy Act of 2012 focuses on protecting personal data and ensuring its secure handling.

Lesson:

- **A) Intellectual property rights:** Are covered under other laws, such as the Intellectual Property Code.

- **C) Freedom of expression:** Is a constitutional right and not the primary focus of this act.

- **D) Trade secrets:** Are generally protected by different commercial and contract laws.

6. Feature of Multitasking Operating Systems

Question:
Which of the following is a common feature of multitasking operating systems?
Options:
A) Only one application can run at a time
B) Applications must be manually switched
C) Multiple applications can run simultaneously
D) The system cannot run background processes

Correct Answer: C) Multiple applications can run simultaneously

Explanation:
Multitasking operating systems allow several applications to run concurrently, often sharing CPU time.

Lesson:

- **A) Only one application can run at a time:** Describes single-tasking systems.

- **B) Applications must be manually switched:** Modern OS's manage task switching automatically.

- **D) The system cannot run background processes:** In multitasking systems, background processes are a key feature.

---

7. Protocol for Sending Emails

Question:
Which of the following protocols is primarily used for sending emails?
Options:
A) HTTP
B) FTP
C) SMTP
D) SNMP

Correct Answer: C) SMTP

Explanation:
SMTP (Simple Mail Transfer Protocol) is the standard protocol for sending emails over the Internet.

Lesson:

- **A) HTTP:** Is used for web traffic.

- **B) FTP:** Is used for file transfers.

- **D) SNMP:** Is used for network management, not email delivery.

---

8. Diagram for Representing Data Flow in Systems Design

Question:
Which of the following is a common diagram used in systems design to represent the flow of data?
Options:
A) Entity-Relationship Diagram (ERD)
B) Gantt Chart
C) Use Case Diagram
D) Data Flow Diagram (DFD)

Correct Answer: D) Data Flow Diagram (DFD)

Explanation:
A DFD visually represents how data moves through a system, making it a common tool in systems design.

Lesson:

- **A) ERD:** Illustrates the relationships between data entities, not the flow of data.

- **B) Gantt Chart:** Is used for project scheduling.

- **C) Use Case Diagram:** Shows system functionality and user interactions rather than data flow.

---

9. Technique in Software Testing to Identify Bugs

Question:
Which of the following is a common technique used in software testing to identify bugs?
Options:
A) Code review
B) Requirement gathering
C) User training
D) Marketing analysis

Correct Answer: A) Code review

Explanation:
Code review involves systematically examining source code to detect errors and potential improvements.

Lesson:

- **B) Requirement gathering:** Is part of the planning phase and does not directly detect bugs.

- **C) User training:** Focuses on educating users rather than testing the software.

- **D) Marketing analysis:** Relates to business strategy, not quality assurance.

---

10. Moore's Law – Transistor Doubling

Question:
In computer engineering, Moore's Law describes the doubling of transistors on a microchip approximately every _____.
Options:
A) 1 year
B) 2 years
C) 3 years
D) 10 years

Correct Answer: B) 2 years

Explanation:
Moore's Law originally stated that the number of transistors on a chip doubles roughly every two

years, driving exponential growth in computing power.

Lesson:

- **A) 1 year:** Too rapid compared to the observed trend.

- **C) 3 years and D) 10 years:** Do not match the historical pace of semiconductor advancement as observed by Moore.

Difficult Level Questions

1. Tarjan's Algorithm – Data Structure Used

Question:
In Tarjan's algorithm for finding strongly connected components (SCCs) of a directed graph, what data structure is used to maintain the list of vertices?
Options:
A) Queue
B) Stack
C) Priority Queue
D) Binary Heap

Correct Answer: B) Stack

Explanation:
Tarjan's algorithm uses a stack to keep track of vertices in the current search path, which is essential for identifying SCCs.

Lesson:

- **A) Queue:** Would enforce FIFO behavior, which is not suitable for backtracking in depth-first search.

- **C) Priority Queue:** Prioritizes elements by value rather than maintaining search order.

- **D) Binary Heap:** Is optimized for finding minimum or maximum elements, not for tracking recursion paths.

---

2. Multiplexer – Minimum Number of Select Lines

Question:
What is the minimum number of select lines required for an 8-to-1 multiplexer?
Options:
A) 1
B) 3
C) 8
D) 2

Correct Answer: B) 3

Explanation:
An 8-to-1 multiplexer requires 3 select lines because $23=82^3 = 823=8$, which is the number of inputs.

Lesson:

- **A) 1 and D) 2:** Do not provide enough combinations (only 2 and 4 respectively) to address 8 inputs.

- **C) 8:** Would be excessive; it is the number of inputs, not the number of lines required for selection.

---

3. Pipelined Processors – Instruction Dependency

Question:
In pipelined processors, what is the term for the condition where an instruction depends on the result of a previous instruction that has not yet completed?
Options:
A) Structural Hazard
B) Data Hazard
C) Control Hazard
D) Pipeline Stalling

Correct Answer: B) Data Hazard

Explanation:
A Data Hazard occurs when instructions that are close together in the pipeline depend on the results of one another.

Lesson:

- **A) Structural Hazard:** Arises from resource conflicts in the hardware.

- **C) Control Hazard:** Is related to branch instructions affecting the flow of execution.

- **D) Pipeline Stalling:** Is a consequence that may result from a hazard but is not the specific term for the dependency condition.

---

4. Function of the Memory Management Unit (MMU)

Question:
Which of the following best describes the function of a memory management unit (MMU) in a

microprocessor?
Options:
A) It executes instructions from the CPU.
B) It converts virtual addresses to physical addresses.
C) It manages data flow between the CPU and peripherals.
D) It controls the clock speed of the processor.

Correct Answer: B) It converts virtual addresses to physical addresses.

Explanation:
The MMU translates virtual memory addresses into physical addresses, enabling memory protection and efficient use of RAM.

Lesson:

- **A) Executing instructions:** Is the role of the CPU.

- **C) Managing data flow between the CPU and peripherals:** Involves buses and I/O controllers.

- **D) Controlling clock speed:** Is handled by the clock generator and related circuitry.

5. Consequence of Violating the Anti-Cybercrime Law (Online Libel)

Question:
In the Philippines, what is the consequence of violating the Anti-Cybercrime Law, specifically regarding online libel?
Options:
A) Imprisonment of up to six months
B) A fine of up to ₱50,000
C) Imprisonment of up to 12 years
D) A warning from law enforcement

Correct Answer: C) Imprisonment of up to 12 years

Explanation:
Under the law, online libel is treated as a serious offense, with penalties that can include imprisonment of up to 12 years.

Lesson:

- **A) Imprisonment of up to six months and B) A fine of up to ₱50,000:** Are much less severe and do not reflect the statutory penalty for online libel.

- **D) A warning from law enforcement:** Is not a formal penalty under the Anti-Cybercrime Law.

6. Purpose of a System Call

Question:
What is the purpose of a system call in an operating system?
Options:
A) To execute a program directly from the command line
B) To provide an interface between user programs and the OS
C) To enhance graphical user interface (GUI) features
D) To increase the speed of the processor

Correct Answer: B) To provide an interface between user programs and the OS

Explanation:
A system call enables user-level applications to request services (like file I/O, process control, etc.) from the operating system kernel.

Lesson:

- **A) Executing a program from the command line:** Is a function of the shell, not the mechanism of system calls.

- **C) Enhancing GUI features:** Is related to the graphical subsystem, not system calls.

- **D) Increasing processor speed:** Is a hardware characteristic and not controlled by system calls.

7. Purpose of Transmission Control Protocol (TCP)

Question:
What is the purpose of the Transmission Control Protocol (TCP) in computer networking?
Options:
A) To ensure secure data transmission
B) To provide connectionless communication
C) To guarantee the reliable delivery of data packets
D) To handle the encryption of data in transit

Correct Answer: C) To guarantee the reliable delivery of data packets

Explanation:
TCP establishes a connection and ensures that data is transmitted reliably and in order by using acknowledgment packets and retransmissions.

Lesson:

- **A) Secure data transmission:** Typically involves encryption protocols like TLS, not TCP itself.

- **B) Connectionless communication:** Is a feature of UDP, not TCP.

- **D) Handling encryption:** Is the domain of security protocols, not the core functionality of TCP.

---

8. Agile Methodology – Meaning of a Sprint

Question:
In the context of agile methodology, what does the term "sprint" refer to?
Options:
A) A long-term project phase with extensive planning
B) A focused period for completing a specific set of tasks
C) A final review of the project's outcomes
D) A method for testing the system's performance

Correct Answer: B) A focused period for completing a specific set of tasks

Explanation:
A sprint is a time-boxed interval—usually a few weeks—during which a defined set of work must be completed and made ready for review.

Lesson:

A) A long-term phase: Is contrary to the short, iterative nature of sprints.

- **C) A final review:** Typically occurs at the end of the sprint, not as the sprint itself.

- **D) Testing performance:** Is a specific type of testing, not representative of what a sprint is designed for.

---

9. Purpose of Version Control

Question:
In software development, what is the purpose of version control?

Options:
A) To manage project budgets
B) To track changes to code over time
C) To enhance system performance
D) To ensure user satisfaction

Correct Answer: B) To track changes to code over time

Explanation:
Version control systems (like Git) record modifications to code so that developers can revert to earlier versions, collaborate effectively, and maintain a history of changes.

Lesson:

- **A) Managing project budgets:** Is a financial task unrelated to code management.

- **C) Enhancing system performance:** Focuses on runtime efficiency, not source code tracking.

- **D) Ensuring user satisfaction:** Involves product design and user experience, not version control.