CUET 2026 Computer Science May 21 Shift 1

Question Paper (Memory-Based) with Solutions

Conducted by National Testing Agency (NTA)

General Instructions

(i) The examination will be conducted in Computer-Based Test (CBT) mode.

(ii) Each question carries +5 marks for correct answer and -1 mark for wrong answer.

(iii) The total number of questions are 50.

(iv) Duration of the exam is 1 hour (60 minutes).

1. Which switching technique is used in the Internet?

(A) Circuit switching

(B) Packet switching

(C) Message switching

(D) Line switching

Correct Answer: (B) Packet switching

Solution:

Step 1: Understanding the Question:

The question asks for the fundamental data transmission mechanism employed by the global Internet to route information from source to destination.

Step 2: Detailed Explanation:

- The Internet operates primarily on the TCP/IP protocol suite, which relies on packet switching technology.
- In packet switching, data is broken down into smaller, manageable units called packets before transmission.

• Each packet contains a payload (the actual data) and a header (which includes source and destination IP addresses).
• Unlike circuit switching, packet switching does not require a dedicated physical path to be established between the sender and receiver.
• Instead, packets travel independently across the network and can take different paths to reach the same destination.
• Routers along the way examine the destination address in the header of each packet to determine the next hop.
• Once all packets arrive at the destination, they are reassembled in the correct order to recreate the original message.
• This method is highly efficient as it maximizes bandwidth utilization by allowing multiple users to share the same physical communication channels.
• If a packet is lost or corrupted during transit, only that specific packet needs to be retransmitted, rather than the entire message.

Step 3: Final Answer:
Therefore, packet switching is the core switching technique utilized in the Internet, making option (B) the correct answer.

Quick Tip: Remember that public switched telephone networks (PSTN) use circuit switching, which reserves a dedicated path, whereas data networks like the Internet use packet switching for resource sharing and resilience.

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2. Telephone conversation is an example of

(A) Simplex
(B) Half duplex
(C) Full duplex
(D) Message switching

Correct Answer: (C) Full duplex

Solution:

Step 1: Understanding the Question:

The question asks us to identify the transmission mode of a standard telephone conversation from the given communication modes.

Step 2: Detailed Explanation:

• In data communication, transmission mode refers to the direction of signal flow between two connected devices.

• There are three primary modes: simplex, half-duplex, and full-duplex.

• In simplex mode, communication is strictly unidirectional, where one device transmits and the other only receives (e.g., traditional television broadcasting).

• In half-duplex mode, communication is bidirectional, but only one party can transmit at a time (e.g., walkie-talkies where users must wait for the other to finish speaking).

• In full-duplex mode, communication is bidirectional and simultaneous, meaning both parties can transmit and receive data at the same time.

• A telephone conversation allows both participants to speak and hear each other simultaneously without any delay or waiting for the channel to clear.

• This capability makes a telephone conversation a classic example of full-duplex communication.

• This is achieved by using two separate transmission paths or frequency bands within the same communication medium.

Step 3: Final Answer:

Hence, a telephone conversation is an example of full-duplex transmission, corresponding to option (C).

Quick Tip: Remember that full-duplex allows simultaneous bidirectional communication (like modern phones), while half-duplex is bidirectional but non-simultaneous (like walkie-talkies).

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3. Linear search works best on:

(A) Sorted list only

(B) Unsorted list

(C) Binary tree

(D) Graph

Correct Answer: (B) Unsorted list

Solution:

Step 1: Understanding the Question:

The question aims to identify the data structure configuration or state where linear search is the most suitable or standard searching method.

Step 2: Detailed Explanation:

• Linear search (or sequential search) is a fundamental algorithm that checks each element of a list sequentially until a match is found or the end is reached.

• In a sorted list, highly efficient algorithms like binary search can find elements in logarithmic time, $O(\log n)$, making linear search inefficient there.

• However, when a list is unsorted, there is no inherent order to exploit, meaning we cannot skip any elements using binary search or other divide-and-conquer methods.

• Thus, for an unsorted list, a sequential scan using linear search is the only straightforward and direct option available.

• While its worst-case time complexity is $O(n)$ regardless of the sorting status, linear search is considered the best choice for unsorted or small datasets where sorting overhead is not justified.

• Binary trees and graphs require specialized traversal algorithms like Depth First Search (DFS) or Breadth First Search (BFS) rather than simple linear search.

Step 3: Final Answer:

Therefore, linear search is best suited for an unsorted list, which corresponds to option (B).

Quick Tip: If a list is already sorted, always prefer binary search over linear search because its time complexity is significantly lower. For unsorted lists, linear search is the standard choice.

4. Which search method has logarithmic complexity?

(A) Linear search

(B) Binary search

(C) Sequential search

(D) None

Correct Answer: (B) Binary search

Solution:

Step 1: Understanding the Question:

The question asks us to identify the search algorithm that possesses a time complexity of $O(\log n)$ (logarithmic complexity).

Step 2: Key Formula or Approach:

The time complexity of an algorithm measures the relationship between the input size n and the number of operations performed. Logarithmic complexity is represented as $O(\log n)$.

Step 3: Detailed Explanation:

• Linear search and sequential search are identical algorithms that scan a list from the first element to the last, resulting in a linear time complexity of $O(n)$.

• Binary search works on a sorted array by repeatedly dividing the search interval in half.

• At each step, the algorithm compares the target value with the middle element of the array.

• If the target is smaller, the search continues in the left half; if larger, it continues in the right half.

• This step-by-step halving of the search space means that for an array of size n, the maximum number of comparisons required is $\log_2 n$.

• Mathematically, this reduction is modeled by the recurrence relation $T(n) = T(n/2) + c$, which solves to $T(n) = O(\log n)$ using the Master Theorem.

• This logarithmic behavior makes binary search exceptionally fast even for extremely large datasets.

Step 4: Final Answer:

Therefore, binary search has a logarithmic complexity of $O(\log n)$, which matches option (B).

Quick Tip: Logarithmic search space reduction (halving at each step) always indicates a logarithmic time complexity of $O(\log n)$. Ensure the dataset is sorted before applying binary search!

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5. Who developed Python programming language?

(A) Dennis Ritchie

(B) James Gosling

(C) Guido van Rossum

(D) Bjarne Stroustrup

Correct Answer: (C) Guido van Rossum

Solution:

Step 1: Understanding the Question:

The question asks us to identify the creator of the Python programming language from the provided list of prominent computer scientists.

Step 2: Detailed Explanation:

• Python was conceived and developed by Guido van Rossum in the late 1980s at the Centrum Wiskunde & Informatica (CWI) in the Netherlands.

• The language was officially released in February 1991 as a successor to the ABC programming language.

• Let us analyze the other options to understand their contributions to computer science:

• Dennis Ritchie created the C programming language at Bell Labs in the early 1970s and co-created the UNIX operating system.

• James Gosling is widely known as the father of the Java programming language, which he developed while working at Sun Microsystems.

• Bjarne Stroustrup designed and developed the C++ programming language as an extension

of the C language, adding object-oriented features.

• Guido van Rossum managed the development of Python for many years as its Benevolent Dictator for Life (BDFL) until he stepped down in 2018.

Step 3: Final Answer:

Consequently, Python was developed by Guido van Rossum, making option (C) the correct choice.

Quick Tip: Memorize the creators of major languages: Guido van Rossum (Python), Dennis Ritchie (C), James Gosling (Java), and Bjarne Stroustrup (C++). These are very frequent in competitive exams!

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6. Which keyword is used to define a function in Python?

(A) function

(B) define

(C) def

(D) fun

Correct Answer: (C) def

Solution:

Step 1: Understanding the Question:

This question asks for the specific reserved word (keyword) used in Python syntax to declare and define a user-defined function.

Step 2: Detailed Explanation:

• In Python, functions are defined using the reserved keyword `def`.

• The general syntax of a function definition in Python is as follows:

• `def function_name(parameters):` followed by an indented block of code representing the function body.

• Let us evaluate the alternative options:

• Option (A) `function` is used in languages like JavaScript, PHP, and Swift to define functions, but it is not a keyword in Python.
• Option (B) `define` is used in some macro systems (like C/C++ preprocessors via `#define`) but is not a valid Python keyword for functions.
• Option (D) `fun` is used in languages such as Kotlin and Rust (which uses `fn`) but is incorrect in the context of Python.
• The `def` keyword stands for "define" and is a core part of Python's simple and readable syntax.

Step 3: Final Answer:
Therefore, the correct keyword to define a function in Python is `def`, which corresponds to option (C).

Quick Tip: Python uses very concise keywords. For defining functions, always use `def`, and remember that Python function definitions must be followed by a colon and indentation.

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7. Which operator is used for logical AND?

(A) &&
(B) and
(C) &
(D) AND

Correct Answer: (A) &&

Solution:
Step 1: Understanding the Question:
The question asks for the standard operator used to perform a logical AND operation in programming languages.

Step 2: Detailed Explanation:
• Logical operators are used to combine multiple boolean conditions and return a boolean

result based on the truth values of the operands.

• In the majority of widely used programming languages (such as C, C++, Java, JavaScript, and C#), the double ampersand `&&` is the standard symbol for logical AND.

• A logical AND operation evaluates to true if and only if both of its operands are true; otherwise, it evaluates to false.

• In contrast, a single ampersand `&` represents a bitwise AND operator, which performs operations at the binary digit level rather than evaluating overall logical truth.

• In some languages like Python, the keyword `and` is used for logical operations, but in standard computer science curriculum questions, `&&` is typically the primary symbol taught.

• Thus, looking at the choices, both `&&` and `and` are used in different environments, but `&&` represents the classical symbolic logical AND operator across most C-family languages.

Step 3: Final Answer:

Thus, the operator used for logical AND in most standard programming languages is `&&`, matching option (A).

Quick Tip: Be careful with single vs double symbols: `&&` is logical AND, while `&` is bitwise AND. In Python, the word `and` is used instead of symbols.

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8. Which one of the following is the Middle element index formula:

(A) $(\text{low} + \text{high})/2$

(B) $\text{low} \times \text{high}$

(C) $\text{high} - \text{low}$

(D) low/high

Correct Answer: (A) $(\text{low} + \text{high})/2$

Solution:

Step 1: Understanding the Question:

The question asks for the correct mathematical formula used to calculate the index of the middle element in a sub-array during algorithms like binary search.

Step 2: Key Formula or Approach:

When searching an array between a lower bound index low and an upper bound index $high$, we find the midpoint to divide the search space.

Step 3: Detailed Explanation:

• To find the exact midpoint of a range bounded by low and $high$, we calculate the arithmetic mean of the two boundaries.

• This is represented as:

$$mid = \frac{low + high}{2}$$

• In integer arithmetic, this division is typically truncated or floor-divided to produce an integer index.

• Let us look at why the other options are mathematically incorrect for finding a midpoint:

• Option (B) $low \times high$ performs multiplication, which yields an unrelated, very large index value.

• Option (C) $high - low$ computes the distance or size of the range, not the midpoint index itself.

• Option (D) $low/high$ computes a ratio, which is typically close to zero and does not represent a middle index.

• Note: While $(low + high)/2$ is standard, in systems with large arrays, it can cause integer overflow if $low + high$ exceeds the maximum value of a 32-bit integer. To prevent this, the formula can also be written as $low + (high - low)/2$.

Step 4: Final Answer:

Hence, the standard formula to find the middle element index is $(low + high)/2$, which is option (A).

Quick Tip: Standard midpoint formula is $(low + high)/2$. For overflow-safe implementations in competitive coding, write it as $low + (high - low)/2$.

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9. Which of the following is NOT an element of communication?

(A) Sender

(B) Receiver

(C) Feedback

(D) Compiler

Correct Answer: (D) Compiler

Solution:

Step 1: Understanding the Question:

The question asks us to identify which of the given terms is not a component of the standard communication process or system.

Step 2: Detailed Explanation:

- A standard communication system consists of several essential elements that enable the transmission of information from one point to another.
- The "Sender" (or source) is the entity that originates and encodes the message to be sent.
- The "Receiver" is the target entity that receives and decodes the message.
- The "Feedback" is the response returned by the receiver to the sender, confirming that the message was received and understood.
- Other elements of communication include the message itself, the medium/channel, and noise.
- A "Compiler," on the other hand, is a specialized computer program that translates source code written in a high-level programming language into machine code or lower-level instructions.
- The compiler is a tool in computer programming and software development, and has no direct relation to the basic elements of human or general data communication.

Step 3: Final Answer:

Thus, Compiler is NOT an element of communication, which aligns with option (D).

Quick Tip: The core elements of communication are Sender, Message, Channel, Receiver, and Feedback. A compiler is a software translation tool and does not belong to this communication cycle.

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10. Linear search is useful when:

(A) Data is small

(B) Data is unsorted

(C) Both A and B

(D) None

Correct Answer: (C) Both A and B

Solution:

Step 1: Understanding the Question:

The question explores the specific conditions under which linear search is considered practical, efficient, or necessary.

Step 2: Detailed Explanation:

• Linear search compares every element of a list sequentially until the target element is found or the list ends.

• First, consider when data is small: For small lists, the overhead of sorting the list to apply more complex algorithms like binary search is not worth the computational cost.

• Linear search performs very fast in practice for small inputs because of its simple design and minimal overhead.

•;; Second, consider when data is unsorted: In an unsorted array, we cannot make any assumptions about where elements reside.

• Because there is no order, we cannot use divide-and-conquer algorithms like binary search.

• Hence, linear search is the only viable standard option to search for a value in an unsorted

array.

• Thus, both statements (A) "Data is small" and (B) "Data is unsorted" are correct scenarios where linear search is highly useful and appropriate.

Step 3: Final Answer:

Therefore, linear search is useful under both conditions, making option (C) the correct answer.

Quick Tip: While binary search has a better time complexity, it requires the data to be sorted. Linear search is the go-to method when the dataset is unsorted or very small.

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