CUET-UG Computer Science Sample Paper-12

Duration: 1 Hour **Maximum Marks: 250**

Instructions

- This paper contains a total of 50 Multiple Choice Questions.
- Each correct answer carries **+5 marks**.
- Each incorrect answer carries **-1 mark**.
- No negative marking for unattempted questions.

Q1. Which SQL function is used to return the current system date and time?

(A) DATE()

(B) GETDATE()

(C) NOW()

(D) CURRENT()

Q2. What will be the output of the SQL command: `SELECT ROUND(8.76, 1);`

(A) 8.7

(B) 8.8

(C) 9.0

(D) 8.0

Q3. Which function is used to find the total number of characters in a string in MySQL?

(A) COUNT()

(B) LEN()

(C) LENGTH()

(D) SIZE()

Q4. Which of the following functions will return '2026' from the date '2026-05-12'?

(A) EXTRACT(YEAR)

(B) YEAR()

(C) GETYEAR()

(D) Both (A) and (B)

Q5. The SQL function `INSTR("CUET EXAM", "E")` will return:

(A) 2

(B) 3

(C) 6

(D) 5

Q6. Which function converts a string to all lowercase letters?

(A) LOWER()

(B) LCASE()

(C) SMALL()

(D) Both (A) and (B)

Q7. What is the output of `SELECT MOD(11, 3);`

(A) 3

(B) 1

(C) 2

(D) 0.66

Q8. Which function is used to remove leading spaces from a string?

(A) TRIM()

(B) LTRIM()

(C) RTRIM()

(D) LEFT()

Q9. In Relational Algebra, the symbol σ (Sigma) represents which operation?

(A) Projection

(B) Selection

(C) Union

(D) Join

Q10. A key that consists of more than one attribute to uniquely identify a tuple is called a:

(A) Primary Key

(B) Foreign Key

(C) Composite Key

(D) Alternate Key

Q11. Which property ensures that a Foreign Key value must match a Primary Key value in the parent table?

(A) Entity Integrity

(B) Domain Integrity

(C) Referential Integrity

(D) Redundancy

Q12. Which operation is used to combine all columns from two relations where the join condition is met?

(A) Cartesian Product

(B) Natural Join

(C) Set Difference

(D) Intersection

Q13. In which topology is every node connected to exactly two other nodes, forming a single continuous pathway for signals?

(A) Star

(B) Mesh

(C) Ring

(D) Bus

Q14. Which device is used to connect different network segments and works at the Network Layer of the OSI model?

(A) Hub

(B) Switch

(C) Router

(D) Repeater

Q15. What is the size of an IPv4 address?

(A) 32 bits

(B) 48 bits

(C) 64 bits

(D) 128 bits

Q16. Which data structure works on the FIFO (First-In-First-Out) principle?

(A) Stack

(B) Queue

(C) Tree

(D) Graph

Q17. What is the postfix form of the infix expression: `A + B * C`?

(A) ABC*+

(B) AB+C*

(C) A+BC*

(D) ABC+*

Q18. The operation of adding an element to a stack is known as:

(A) Pop

(B) Enqueue

(C) Push

(D) Dequeue

Q19. In a queue implemented using a Python list, which method is typically used to remove the first element?

(A) pop()

(B) pop(0)

(C) remove()

(D) delete(0)

Q20. What is the prefix form of the expression: `(A - B) / D`?

(A) /-ABD

(B) AB-D/

(C) /AB-D

(D) -AB/D

Q21. A stack-underflow condition occurs when:

(A) Pushing into a full stack

(B) Popping from an empty stack

(C) Peek at a full stack

(D) Sorting a stack

Q22. Which pointer in a queue tracks the position where the next element will be added?

(A) Front

(B) Top

(C) Rear

(D) Base

Q23. Evaluate the postfix expression: `6 2 3 * +`

(A) 24

(B) 11

(C) 12

(D) 18

Q24. Which data structure is best suited for reversing a string?

(A) Queue

(B) List

(C) Stack

(D) Array

Q25. In a circular queue, the next position for Rear is calculated as:

(A) (Rear + 1)

(B) (Rear + 1) % MaxSize

(C) Rear % MaxSize

(D) (Rear - 1) % MaxSize

Q26. Which of the following is a non-linear data structure?

(A) Stack

(B) String

(C) List

(D) Tree

Q27. What is the maximum number of comparisons in a Linear Search for a list of n elements?

(A) $n/2$

(B) $\log n$

(C) n

(D) n^2

Q28. Binary Search can only be applied to a list that is:

(A) Unsorted

(B) Sorted

(C) Empty

(D) Small

Q29. Which sorting algorithm works by repeatedly finding the minimum element from the unsorted part and putting it at the beginning?

(A) Bubble Sort

(B) Insertion Sort

(C) Selection Sort

(D) Quick Sort

Q30. In Bubble Sort, after the first pass, which element is guaranteed to be at its correct position?

(A) Smallest

(B) Largest

(C) Middle

(D) None

Q31. What is the average case time complexity of Binary Search?

(A) $O(n)$

(B) $O(n^2)$

(C) $O(\log n)$

(D) $O(1)$

Q32. Which sort is often compared to the way one sorts a deck of cards?

(A) Selection Sort

(B) Bubble Sort

(C) Insertion Sort

(D) Merge Sort

Q33. Which of the following is a "divide and conquer" algorithm?

(A) Linear Search

(B) Selection Sort

(C) Binary Search

(D) Insertion Sort

Q34. How many passes are required to sort a list of 5 elements using Bubble Sort?

(A) 5

(B) 4

(C) 10

(D) 25

Q35. In Selection Sort, if the list is [12, 5, 8], what will it look like after the first swap?

(A) 5, 12, 8

(B) 5, 8, 12

(C) 8, 5, 12

(D) 12, 5, 8

Q36. Which keyword is used to handle the code if an exception occurs in the `try` block?

(A) catch

(B) error

(C) except

(D) finally

Q37. What mode should be used to open a file for reading and writing in binary format?

(A) 'wb'

(B) 'rb+'

(C) 'ab'

(D) 'r+'

Q38. Which function is used to write a list of strings into a file?

(A) write()

(B) writeall()

(C) writelines()

(D) putlines()

Q39. What is the output of `f.tell()` in Python file handling?

(A) Returns the file name

(B) Returns the current position of the file pointer

(C) Returns the size of the file

(D) Returns the file mode

Q40. Which block is executed regardless of whether an exception was raised or not?

(A) finally

(B) else

(C) except

(D) catch

Q41. To append data to an existing text file, which mode is used?

(A) 'w'

(B) 'r'

(C) 'a'

(D) 'x'

Q42. Which module is required to perform read and write operations on a binary file in Python?

(A) math

(B) os

(C) pickle

(D) sys

Q43. The `seek(5, 0)` method moves the file pointer to:

(A) 5 bytes from the current position

(B) 5 bytes from the end of the file

(C) 5 bytes from the beginning of the file

(D) The 5th line of the file

Q44. Which protocol is used to transfer files over the Internet?

(A) HTTP

(B) FTP

(C) SMTP

(D) TCP

Q45. Which type of switching establishes a dedicated physical path between the sender and receiver?

(A) Packet Switching

(B) Circuit Switching

(C) Message Switching

(D) Data Switching

Q46. Which type of network attack involves an attacker intercepting and potentially altering the communication between two parties who believe they are directly communicating with each other?

(A) Phishing

(B) Man-in-the-Middle (MitM) attack

(C) Denial of Service (DoS)

(D) Ransomware

Q47. A computer program that appears useful but carries a hidden malicious payload is called a:

(A) Virus

(B) Worm

(C) Trojan Horse

(D) Spam

Q48. Which of the following is an example of a secure protocol?

(A) HTTP

(B) FTP

(C) HTTPS

(D) Telnet

Q49. What is the primary difference between a Virus and a Worm?

(A) A virus is harmful, a worm is not

(B) A virus requires human action to spread, a worm replicates automatically

(C) A worm is faster than a virus

(D) There is no difference

Q50. An attempt to acquire sensitive information such as usernames and passwords by masquerading as a trustworthy entity is:

(A) Phishing

(B) Hacking

(C) Cracking

(D) Snooping

Detailed Solutions

Q1.

Solution

Concept: SQL provides functions to retrieve the current system date and time.
Key Function:

- `NOW()` returns the current system date and time

:contentReference[oaicite:0]index=0
Explanation:

- `DATE()` → extracts only date
- `GETDATE()` → used in SQL Server (not standard MySQL)
- `CURRENT()` → not valid SQL function

Final Answer: NOW()

Answer: (C)

Q2.

Solution

Concept: `ROUND()` rounds a number to specified decimal places.
Given:

$$\texttt{ROUND}(8.76, 1)$$

Rule:

- Check second decimal place (6)
- Since it is ≥ 5, round up the first decimal

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Result:

$$8.76 \approx 8.8$$

Final Answer: 8.8

Answer: (B)

Q3.

Solution

Concept: String functions in MySQL are used to manipulate and analyze text.
Key Function:

- `LENGTH()` returns the total number of characters in a string

:contentReference[oaicite:0]index=0
Explanation:

- `COUNT()` → counts rows
- `LEN()` → used in SQL Server, not MySQL
- `SIZE()` → not a valid SQL function

Final Answer: LENGTH()

Answer: (C)

Q4.

Solution

Concept: Date functions extract specific parts (year, month, etc.) from a date.
Key Functions:

- `YEAR(date)` returns the year
- `EXTRACT(YEAR FROM date)` also returns the year

:contentReference[oaicite:1]index=1
Explanation:

- Both `YEAR()` and `EXTRACT(YEAR)` give 2026
- `GETYEAR()` is not valid

Final Answer: Both (A) and (B)

Answer: (D)

Q5.

Solution

Concept: The SQL `INSTR()` function returns the position of the **first occurrence** of a substring within a string (position starts from 1).

Given:

```
INSTR("CUET EXAM", "E")
```

String Breakdown:

- C(1), U(2), E(3), T(4), ␣(5), E(6), X(7), A(8), M(9)

Observation:

- First occurrence of 'E' is at position 3

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Final Answer: 3

Answer: (B)

Q6.

Solution

Concept: In SQL, string manipulation functions are used to modify and format textual data. Functions like LOWER() and LCASE() convert all characters in a string to lowercase, ensuring uniformity in comparisons and output. These functions are especially useful when performing case-insensitive searches or standardizing data input. Different database systems may support one or both functions, but their purpose remains the same—converting uppercase or mixed-case strings into lowercase format.

Solution: The question asks which function converts a string to all lowercase letters. In SQL, both LOWER() and LCASE() are used for this purpose. LOWER() is the standard ANSI SQL function and is widely supported across most database systems. LCASE() is also used in systems like MySQL and performs the same operation. The function SMALL() is not related to string conversion; instead, it is used in spreadsheet applications like Excel. Since both LOWER() and LCASE() correctly perform the required operation of converting strings to lowercase, the correct answer must include both options.

Final Answer: Both (A) and (B)

Answer: (D)

Q7.

Solution

Concept: The SQL `MOD(a, b)` function returns the remainder when a is divided by b.

Given:

$$\texttt{MOD}(11, 3)$$

Calculation:

- $11 \div 3 = 3$ remainder 2

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Explanation:

- $3 \times 3 = 9$
- $11 - 9 = 2$ (remainder)

Final Answer: 2

Answer: (C)

Q8.

Solution

Concept: SQL provides several string functions to remove unwanted spaces from text. Leading spaces are those that appear at the beginning of a string. The LTRIM() function is specifically designed to remove these leading spaces, ensuring cleaner and standardized data. TRIM() removes both leading and trailing spaces, while RTRIM() removes only trailing spaces. These functions are essential in data cleaning and preprocessing tasks.

Solution: The question asks which function removes leading spaces from a string. Among the given options, LTRIM() is specifically designed to remove spaces from the left side (beginning) of a string. TRIM() removes spaces from both ends, which is broader than required. RTRIM() removes spaces only from the right side, and LEFT() is used to extract a substring from the left, not to remove spaces. Therefore, the function that precisely matches the requirement of removing only leading spaces is LTRIM().

Final Answer: LTRIM()

Answer: (B)

Q9.

Solution

Concept: In relational algebra, symbols are used to represent different operations performed on relations (tables). The symbol σ (sigma) denotes the selection operation. Selection is used to filter rows from a relation based on a specified condition. It works similarly to the WHERE clause in SQL. This operation helps retrieve only those tuples that satisfy a given predicate, making it essential for querying and data retrieval.

Solution: The question asks what operation the symbol σ represents in relational algebra. The sigma symbol is universally used to denote the selection operation. Selection filters rows based on a condition, such as selecting employees with a salary greater than a certain value. Projection, represented by π, selects columns rather than rows. Union combines tuples from two relations, and join combines related tuples from different relations. Since σ specifically filters rows based on conditions, it corresponds to the selection operation.

Final Answer: Selection

Answer: (B)

Q10.

Solution

Concept: In databases, keys are used to uniquely identify records (tuples) in a table.

Key Definition:

- A **Composite Key** is a key formed by combining two or more attributes to uniquely identify a tuple

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Explanation:

- Primary Key → single or chosen key (can be composite but not always)
- Foreign Key → references another table
- Alternate Key → candidate keys not selected as primary

$$\text{Attr1 + Attr2} \longrightarrow \text{Unique Record}$$

Composite Key

Final Answer: Composite Key

Answer: (C)

Q11.

Solution

Concept: Referential integrity is a fundamental principle in relational databases that ensures consistency between related tables. It enforces rules so that a foreign key in one table must correspond to an existing primary key in another table. This prevents invalid or orphan records and maintains logical relationships. By enforcing referential integrity, databases ensure that data remains accurate, consistent, and meaningful across multiple related tables.

Solution: The question asks which property ensures that a foreign key value must match a primary key value in the parent table. Referential integrity is specifically designed for this purpose. It ensures that any value entered in a foreign key column must already exist in the referenced primary key column or be null (if allowed). Entity integrity, on the other hand, ensures that primary keys are unique and not null. Domain integrity enforces valid data types and ranges for attributes. Redundancy refers to unnecessary duplication of data, not a constraint. Since the requirement is about maintaining valid relationships between tables through matching key values, referential integrity is the correct choice. This constraint is essential for preserving relationships and avoiding inconsistencies in relational databases.

Final Answer: Referential Integrity

Answer: (C)

Q12.

Solution

Concept: In relational algebra, join operations are used to combine tuples from two relations based on a related attribute. A natural join automatically matches columns with the same name and compatible data types, combining rows where the values are equal. It eliminates duplicate columns and produces a meaningful merged relation. This operation is widely used to retrieve related data stored across multiple tables efficiently.

Solution: The question asks which operation combines all columns from two relations where the join condition is satisfied. A natural join performs exactly this function by matching rows based on common attributes and merging them into a single result. Cartesian product combines all possible pairs of rows without any condition, leading to a much larger result set. Set difference returns tuples present in one relation but not in another, while intersection returns only common tuples. Neither of these performs column-wise merging based on a condition. Since the requirement involves combining rows with matching attributes and including relevant columns, natural join is the correct operation. It ensures meaningful and condition-based merging of relations.

Final Answer: Natural Join

Answer: (B)

Q13.

Solution

Concept: Network topology defines the physical or logical arrangement of nodes in a network. In a ring topology, each node is connected to exactly two other nodes, forming a circular pathway. Data travels in one or both directions around the ring until it reaches its destination. This structure ensures equal access but can be affected if one node fails, disrupting the entire network.

Solution: The question describes a topology where every node is connected to exactly two other nodes, forming a continuous pathway. This matches the definition of a ring topology. In a star topology, all nodes are connected to a central hub. In a mesh topology, each node is connected to multiple or all other nodes, providing redundancy. In a bus topology, all devices share a single communication line. Only the ring topology satisfies the condition where each node has exactly two connections and forms a loop. Therefore, based on the structure and data flow described, the correct answer is ring topology.

Final Answer: Ring

Answer: (C)

Q14.

Solution

Concept: In computer networks, devices operate at different layers of the OSI model. A router is a network layer device responsible for forwarding data packets between different networks based on IP addresses. It determines the best path for data transmission and connects multiple network segments. Routers play a crucial role in enabling communication across different networks, including the internet.

Solution: The question asks which device connects different network segments and operates at the network layer of the OSI model. A router performs this function by directing data packets between networks using logical addressing. A hub operates at the physical layer and simply broadcasts signals. A switch works at the data link layer and forwards frames within the same network. A repeater also operates at the physical layer and only regenerates signals. Since the requirement specifies both inter-network connectivity and network layer operation, router is the correct answer. It ensures efficient data routing between different network segments.

Final Answer: Router

Answer: (C)

Q15.

Solution

Concept: An IPv4 address is a logical address used to identify devices on a network.
Key Point:

- IPv4 address consists of **32 bits**
- Divided into 4 octets (each 8 bits)

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Explanation:

- Example: 192.168.1.1
- Each number represents 8 bits

$$\text{IPv4} \longrightarrow \text{32 bits}$$

4 Octets

Final Answer: 32 bits

Answer: (A)

Q16.

Solution

Concept: Data structures organize and manage data efficiently. A queue is a linear data structure that follows the First-In-First-Out (FIFO) principle, meaning the first element inserted is the first one removed. This behavior is similar to real-life queues such as waiting lines. Queues are widely used in scheduling processes, buffering data, and handling requests in systems where order of processing is important.
Solution: The question asks which data structure works on the FIFO principle. A queue strictly follows FIFO, where elements are inserted at the rear and removed from the front. A stack, in contrast, follows Last-In-First-Out (LIFO), where the last inserted element is removed first. Trees and graphs are non-linear data structures and do not inherently follow FIFO order. Since the defining feature of a queue is maintaining the insertion order during deletion, it perfectly matches the FIFO requirement. This makes queues ideal for tasks like printer scheduling, CPU task scheduling, and managing requests in web servers. Therefore, among the given options, queue is the correct data structure that operates on FIFO principle.
Final Answer: Queue

Answer: (B)

Q17.

Solution

Concept: In postfix notation, operators come after operands and operator precedence is followed.
Given Expression:

$$A + B * C$$

Step-wise Conversion:

- Multiplication has higher precedence: $B * C \rightarrow BC*$
- Then addition: $A + (BC*) \rightarrow ABC * +$

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Explanation:

- First evaluate $B * C$
- Then add A

Infix	$\longrightarrow$	Postfix
$A + B * C$		$ABC * +$

Final Answer: $ABC * +$

Answer: (A)

Q18.

Solution

Concept: A stack is a linear data structure that follows the Last-In-First-Out (LIFO) principle. It supports two primary operations: push and pop. The push operation adds an element to the top of the stack, while the pop operation removes the top element. Stacks are widely used in expression evaluation, recursion handling, and memory management where the most recent data needs to be accessed first.
Solution: The question asks for the term used when adding an element to a stack. In stack terminology, inserting an element is called a push operation. Pop refers to removing the top element from the stack. Enqueue and dequeue are operations associated with queues, not stacks. Since the question specifically deals with adding an element to a stack, the correct term must be push. This operation places the new element on top of the existing stack elements, maintaining the LIFO structure. Therefore, among the given options, push is the correct answer as it accurately describes the insertion operation in a stack.
Final Answer: Push

Answer: (C)

Q19.

Solution

Concept: In Python, lists are commonly used to implement queues due to their dynamic nature. A queue requires insertion at the end and deletion from the beginning. Python provides methods like append() to add elements and pop() to remove elements. When an index is specified, pop(index) removes the element at that position. Using pop(0) removes the first element, simulating queue behavior.

Solution: The question asks which method is used to remove the first element from a queue implemented using a Python list. The pop() method without arguments removes the last element, which is suitable for stacks. However, in a queue, removal should happen from the front. By using pop(0), the element at index 0 (the first element) is removed. The remove() method deletes a specific value, not necessarily the first element. The delete(0) method does not exist in Python lists. Therefore, to correctly implement FIFO behavior in a list-based queue, pop(0) is used to remove the front element. Hence, the correct answer is pop(0).

Final Answer: pop(0)

Answer: (B)

Q20.

Solution

Concept: In prefix notation, the operator is written before its operands. Parentheses are not needed once precedence is handled.

Given Expression:

$$(A - B)/D$$

Step-wise Conversion:

- First solve bracket: $A - B \rightarrow -AB$
- Then divide by D: $(-AB)/D \rightarrow /-ABD$

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Explanation:

- '-' is applied to A and B first
- '/' is applied to result and D

Infix	$\longrightarrow$	Prefix
$(A - B)/D$		/-ABD

Final Answer: $/-ABD$

Answer: (A)

Q21.

Solution

Concept: A stack is a linear data structure that follows the Last-In-First-Out (LIFO) principle. It has two main error conditions: overflow and underflow. Stack overflow occurs when an attempt is made to push an element into a full stack. Stack underflow occurs when an attempt is made to pop or access an element from an empty stack. Proper handling of these conditions is essential in program execution.

Solution: The question asks when a stack-underflow condition occurs. Underflow specifically refers to the situation where an operation is performed on an empty stack. In particular, when a pop operation is attempted on an empty stack, there is no element to remove, resulting in underflow. Pushing into a full stack results in overflow, not underflow. Peeking at a full stack is not an error condition, and sorting a stack is unrelated. Since underflow is directly associated with removing elements from an empty stack, the correct answer is popping from an empty stack. This ensures understanding of stack boundary conditions.

Final Answer: Popping from an empty stack

Answer: (B)

Q22.

Solution

Concept: A queue is a linear data structure that follows the FIFO (First-In-First-Out) principle. It uses two pointers: front and rear. The front pointer indicates the position of the element to be removed, while the rear pointer indicates the position where a new element will be inserted. Proper management of these pointers ensures efficient enqueue and dequeue operations in a queue.

Solution: The question asks which pointer tracks the position where the next element will be added in a queue. In queue operations, insertion (enqueue) always happens at the rear end. Therefore, the rear pointer keeps track of the position where the next element will be inserted. The front pointer is used for deletion (dequeue), while top is associated with stacks, and base is not a standard queue pointer. Since the requirement is about insertion position, the rear pointer is the correct answer. It ensures that new elements are added in order, maintaining FIFO behavior.

Final Answer: Rear

Answer: (C)

Q23.

Solution

Concept: Postfix expressions are evaluated using a stack where operators act on the last two operands.

Given Expression:

$$6\ 2\ 3\ *\ +$$

Step-wise Evaluation:

- Push 6, 2, 3 onto stack
- Compute $2 \times 3 = 6$
- Stack becomes: 6, 6
- Compute $6 + 6 = 12$

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Final Calculation:

$$6 + (2 \times 3) = 6 + 6 = 12$$

$$\text{Stack Evaluation} \longrightarrow \quad \text{Result} = 12$$

$$* \text{ then } +$$

Final Answer: 12

Answer: (C)

Q24.

Solution

Concept: A stack is a linear data structure that follows the Last-In-First-Out (LIFO) principle. This property makes it highly suitable for operations where the order of elements needs to be reversed. When elements are pushed onto a stack and then popped, they come out in reverse order. This behavior is widely used in applications like expression evaluation, undo operations, and string reversal.

Solution: The question asks which data structure is best suited for reversing a string. In string reversal, characters are processed in reverse order of their appearance. A stack is ideal because when characters are pushed one by one and then popped, the last inserted character comes out first. This automatically reverses the sequence. A queue follows FIFO and would not reverse the order. A list or array can reverse data but does not inherently provide reversal behavior like a stack. Therefore, due to its LIFO nature, a stack is the most appropriate data structure for this task.

Final Answer: Stack

Answer: (C)

Q25.

Solution

Concept: A circular queue uses modulo arithmetic to reuse freed spaces in a fixed-size array efficiently.

Key Idea:

- After reaching the last index, the next position wraps around to the beginning

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Explanation:

- Simple $Rear + 1$ may overflow array size
- Modulo ensures circular behavior
- Prevents index out of bounds

$$\text{Rear} \longrightarrow \text{Next Position}$$

$$\text{mod MaxSize}$$

Final Answer: $\boxed{(Rear + 1)\ \%\ MaxSize}$

Answer: (B)

Q26.

Solution

Concept: Data structures are classified as linear and non-linear. Linear data structures store elements sequentially, such as arrays, stacks, and lists. Non-linear data structures organize data hierarchically or in interconnected ways. Trees are a common example of non-linear structures, where elements are arranged in parent-child relationships, allowing efficient representation of hierarchical data like file systems and organizational charts.

Solution: The question asks which of the given options is a non-linear data structure. Stack, string, and list are all linear structures where elements are arranged sequentially. A tree, however, organizes data in a hierarchical form with nodes connected in parent-child relationships. This structure allows multiple paths and branching, making it non-linear. Since the defining feature of non-linear structures is that elements are not arranged in a single sequence, tree clearly satisfies this condition. Therefore, the correct answer is tree.

Final Answer: Tree

Answer: (D)

Q27.

Solution

Concept: Linear Search checks each element one by one until the target is found or the list ends.
Worst Case:

- The element is at the last position or not present
- All n elements are compared

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Explanation:

- Best case: 1 comparison
- Average case: $n/2$
- Worst case: n

List $\longrightarrow$Target found at end

n comparisons

Final Answer: $\boxed{n}$

Answer: (C)

Q28.

Solution

Concept: Binary search is an efficient searching algorithm that works by repeatedly dividing the search interval in half. It compares the target value with the middle element of the list and eliminates half of the remaining elements each time. For this approach to work correctly, the data must be arranged in a sorted order so that comparisons can determine the correct direction.
Solution: The question asks under what condition binary search can be applied. Binary search relies on the ability to decide whether to search the left or right half of the list based on comparisons. This is only possible if the list is sorted. If the list is unsorted, there is no logical way to eliminate half of the elements. An empty list contains no elements, and the size of the list does not affect the requirement of sorting. Therefore, the list must be sorted for binary search to function correctly.
Final Answer: Sorted

Answer: (B)

Q29.

Solution

Concept: Sorting algorithms arrange elements in a specific order. Selection sort is a simple sorting technique that repeatedly selects the smallest element from the unsorted portion of the list and places it at the beginning. This process continues until the entire list is sorted. Although not the most efficient for large datasets, it is easy to understand and implement.

Solution: The question asks which sorting algorithm works by repeatedly finding the minimum element from the unsorted part and placing it at the beginning. This description directly matches the working principle of selection sort. Bubble sort repeatedly swaps adjacent elements, insertion sort builds a sorted list by inserting elements at correct positions, and quick sort uses a divide-and-conquer approach. Since only selection sort follows the exact method described, it is the correct answer.

Final Answer: Selection Sort

Answer: (C)

Q30.

Solution

Concept: Bubble sort is a simple comparison-based sorting algorithm where adjacent elements are repeatedly compared and swapped if they are in the wrong order. During each pass, the largest unsorted element "bubbles up" to its correct position at the end of the list. This process continues for multiple passes until the entire list is sorted in the desired order.

Solution: The question asks which element is guaranteed to be at its correct position after the first pass of bubble sort. In one complete pass, the algorithm compares adjacent elements from the beginning to the end of the list and swaps them if needed. By doing so, the largest element moves step by step toward the end of the list. At the end of the first pass, the largest element among all elements is guaranteed to be placed at the last position, which is its correct sorted position. Smaller elements may still be unordered, but the largest element will not move again. Therefore, the correct answer is the largest element.

Final Answer: Largest

Answer: (B)

Q31.

Solution

Concept: Binary Search is a divide-and-conquer algorithm that repeatedly halves the search space.
Key Idea:

- At each step, the array size reduces by half
- Number of steps required is logarithmic

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Explanation:

- Best case: $O(1)$ (middle element found immediately)
- Average case: $O(\log n)$
- Worst case: $O(\log n)$

$$\text{n elements} \xrightarrow{\text{halving each step}} \log n \text{ steps}$$

Final Answer: $\boxed{O(\log n)}$

Answer: (C)

Q32.

Solution

Concept: Insertion sort is a simple sorting algorithm that builds the final sorted array one element at a time. It works similarly to how people sort playing cards in their hands by picking one card at a time and inserting it into its correct position among already sorted cards. This intuitive approach makes insertion sort easy to understand and implement.
Solution: The question asks which sorting algorithm is often compared to sorting a deck of cards. In insertion sort, elements are taken one by one and inserted into their correct position in a partially sorted list, just like arranging cards in hand. Selection sort focuses on repeatedly selecting the minimum element, bubble sort swaps adjacent elements, and merge sort uses a divide-and-conquer approach. Only insertion sort mimics the real-life process of arranging playing cards. Therefore, based on the analogy provided, the correct answer is insertion sort.
Final Answer: Insertion Sort

Answer: (C)

Q33.

Solution

Concept: Divide and conquer is an algorithmic strategy that breaks a problem into smaller subproblems, solves each subproblem independently, and then combines the results. This approach reduces complexity and improves efficiency. Binary search is a classic example, where the search space is divided into halves repeatedly until the desired element is found.

Solution: The question asks which algorithm follows the divide and conquer approach. Binary search divides the sorted list into two halves at each step and decides which half to search next, making it a perfect example of this strategy. Linear search checks elements sequentially without dividing the problem. Selection sort and insertion sort are iterative sorting techniques that do not divide the problem into smaller independent parts. Since binary search systematically reduces the problem size by half, it clearly follows the divide and conquer paradigm. Therefore, the correct answer is binary search.

Final Answer: Binary Search

Answer: (C)

Q34.

Solution

Concept: In Bubble Sort, each pass places the largest unsorted element at its correct position.

Key Idea:

- For n elements, maximum passes required = $n - 1$

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Given:

$$n = 5$$

Calculation:

$$\text{Passes} = 5 - 1 = 4$$

Explanation:

- After each pass, one element reaches its correct position
- Total 4 passes are sufficient for 5 elements

$$5 \text{ elements} \longrightarrow 4 \text{ passes}$$

$$n - 1$$

Final Answer: 4

Answer: (B)

Q35.

Solution

Concept: In Selection Sort, the smallest element is selected from the unsorted part and swapped with the first element.

Given List:

$$[12,\ 5,\ 8]$$

Step 1 (Find Minimum):

- Minimum element = 5

Step 2 (First Swap):

- Swap 12 and 5

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Result after first pass:

$$[5,\ 12,\ 8]$$

$$12, 5, 8 \quad \longrightarrow \quad 5, 12, 8$$

swap min

Final Answer: $[5,\ 12,\ 8]$

Answer: (A)

Q36.

Solution

Concept: Exception handling in programming is used to manage runtime errors and ensure smooth execution of programs. In Python, the try block is used to enclose code that may cause an exception, while the except block is used to handle the error if it occurs. This mechanism prevents program crashes and allows developers to define alternative actions when errors arise.

Solution: The question asks which keyword is used to handle code execution if an exception occurs in the `try` block. In Python, the `except` keyword is specifically designed to catch and handle exceptions raised in the try block. The keyword `catch` is used in other programming languages like Java but not in Python. `error` is not a valid keyword for exception handling, and `finally` is used to execute code regardless of whether an exception occurs or not. Therefore, the correct keyword for handling exceptions in Python is `except`.

Final Answer: except

Answer: (C)

Q37.

Solution

Concept: In Python file handling, different modes are used to open files for reading, writing, and binary operations.

Key Idea:

- `'rb+'` opens a file for both reading and writing in binary mode

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Explanation of Options:

- `'wb'` → write binary only
- `'rb+'` → read + write binary (correct)
- `'ab'` → append binary only
- `'r+'` → read + write (text mode)

File ⟶ Binary R/W

rb+

Final Answer: rb+

Answer: (B)

Q38.

Solution

Concept: In Python file handling, different functions are used to write data into files. The `write()` function writes a single string, while `writelines()` is used to write multiple strings from a list into a file. This function does not automatically add newline characters, so they must be included manually if required. It is useful when dealing with collections of text data.

Solution: The question asks which function is used to write a list of strings into a file. The correct function is `writelines()`, which takes an iterable (like a list of strings) and writes each element to the file sequentially. The `write()` function only writes a single string, `writeall()` and `putlines()` are not valid Python file methods. Therefore, when working with multiple strings stored in a list, `writelines()` is the appropriate choice for writing them into a file.

Final Answer: writelines()

Answer: (C)

Q39.

Solution

Concept: In Python file handling, a file pointer keeps track of the current position within an open file. The `tell()` method is used to determine this position. It returns an integer value representing the number of bytes from the beginning of the file. This function is useful when navigating files, especially when combined with `seek()` to move the pointer to a specific location.

Solution: The question asks what `f.tell()` returns in Python file handling. The `tell()` method provides the current position of the file pointer, indicating how far the pointer has moved from the start of the file in bytes. It does not return the file name, size, or mode. Those are accessed through other means such as file attributes or system functions. Since the purpose of `tell()` is to track the pointer's position, the correct answer is that it returns the current position of the file pointer.

Final Answer: Returns the current position of the file pointer

Answer: (B)

Q40.

Solution

Concept: Exception handling in Python includes multiple blocks such as try, except, else, and finally. The finally block is designed to execute code regardless of whether an exception occurs or not. It is typically used for cleanup actions like closing files or releasing resources, ensuring that essential operations are always performed after the try-except execution.

Solution: The question asks which block is executed regardless of whether an exception is raised. The `finally` block always runs after the try and except blocks, making it ideal for cleanup operations. The `else` block executes only if no exception occurs, while `except` runs only when an exception is raised. The keyword `catch` is not used in Python. Therefore, since the finally block executes in all situations, it is the correct answer.

Final Answer: finally

Answer: (A)

Q41.

Solution

Concept: File modes in Python define how a file is opened for reading, writing, or appending.
Key Idea:

- `'a'` mode is used to append data to an existing file without deleting its content

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Explanation of Options:

- `'w'` → write mode (overwrites file)
- `'r'` → read mode only
- `'a'` → append mode (correct)
- `'x'` → create new file, fails if exists

Existing File $\xrightarrow{\text{append}}$ Add New Data

Final Answer: a

Answer: (C)

Q42.

Solution

Concept: Binary file handling in Python often involves storing and retrieving complex data structures such as objects. The `pickle` module is commonly used for this purpose. It allows serialization (converting objects into byte streams) and deserialization (reconstructing objects from byte streams). This makes it suitable for reading and writing structured data in binary files efficiently.
Solution: The question asks which module is required to perform read and write operations on a binary file. While basic binary files can be handled using built-in file modes, the `pickle` module is specifically used when dealing with Python objects in binary format. It enables storing complex data structures and retrieving them later. The `math`, `os`, and `sys` modules serve different purposes and are not primarily used for binary file read/write operations. Therefore, the correct answer is `pickle`.
Final Answer: pickle

Answer: (C)

Q43.

Solution

Concept: In Python file handling, the `seek()` method is used to move the file pointer to a specific location. It takes two arguments: offset and reference point. The reference point can be 0 (beginning), 1 (current position), or 2 (end of file). This method allows controlled navigation within a file for reading or writing at desired positions.

Solution: The method `seek(5, 0)` specifies moving the file pointer by 5 bytes from the reference point 0. Since 0 represents the beginning of the file, the pointer is moved to the 5th byte from the start. Option (A) refers to movement from the current position, which would require reference point 1. Option (B) refers to movement from the end, which uses reference point 2. Option (D) incorrectly interprets seek in terms of lines rather than bytes. Therefore, the correct interpretation is moving 5 bytes from the beginning of the file.

Final Answer: 5 bytes from the beginning of the file

Answer: (C)

Q44.

Solution

Concept: File Transfer Protocol (FTP) is a standard network protocol used for transferring files between a client and a server over the Internet. It allows users to upload and download files efficiently. FTP operates over TCP/IP and is specifically designed for file transfer, unlike protocols such as HTTP or SMTP which serve different purposes.

Solution: The question asks which protocol is used to transfer files over the Internet. FTP is explicitly designed for this purpose and supports uploading, downloading, and managing files on remote servers. HTTP is mainly used for web page transfer, SMTP is used for sending emails, and TCP is a transport layer protocol rather than an application-level file transfer protocol. Therefore, FTP is the correct answer.

Final Answer: FTP

Answer: (B)

Q45.

Solution

Concept: Switching techniques are used in networks to transmit data between devices. Circuit switching establishes a dedicated communication path between sender and receiver before data transfer begins. This path remains reserved for the entire duration of communication, ensuring consistent bandwidth and low latency. It is commonly used in traditional telephone networks.

Solution: The question asks which type of switching establishes a dedicated physical path. Circuit switching creates a fixed path that remains active throughout the communication session. Packet switching, in contrast, divides data into packets that travel independently. Message switching stores and forwards entire messages, and "data switching" is not a standard term. Since only circuit switching guarantees a dedicated path, it is the correct answer.

Final Answer: Circuit Switching

Answer: (B)

Q46.

Solution

Concept: Network security attacks are malicious activities aimed at compromising data confidentiality, integrity, or availability. Among them, interception-based attacks target communication channels. A Man-in-the-Middle (MitM) attack occurs when an attacker secretly places themselves between two communicating parties. The attacker can eavesdrop, intercept, and even modify the transmitted data without the knowledge of either party. This makes MitM a serious threat to secure communication systems.

Solution: The question asks which type of attack involves an attacker intercepting and possibly altering communication between two parties who believe they are directly communicating. This description matches a Man-in-the-Middle (MitM) attack. In this attack, the attacker secretly positions themselves between the sender and receiver, capturing data packets in transit. They may only monitor the communication or actively modify the data before forwarding it, making the interaction appear normal to both ends. Phishing involves tricking users into revealing sensitive information through fake messages or websites. Denial of Service (DoS) aims to make a system unavailable by overwhelming it with traffic. Ransomware encrypts data and demands payment for release. Since only MitM focuses on interception and manipulation of communication between two parties, it is the correct answer.

Final Answer: Man-in-the-Middle (MitM) attack

Answer: (B)

Q47.

Solution

Concept: A Trojan Horse is a type of malicious software that disguises itself as a legitimate or useful program. Users are tricked into installing or running it, after which it performs harmful actions such as stealing data or providing unauthorized access. Unlike viruses or worms, it does not replicate itself but relies on deception.

Solution: The question describes a program that appears useful but contains a hidden malicious function. This matches the definition of a Trojan Horse. A virus attaches itself to other files and spreads when executed, while a worm spreads automatically across networks. Spam refers to unwanted messages. Since the key idea is deception and hidden malicious intent, the correct answer is Trojan Horse.

Final Answer: Trojan Horse

Answer: (C)

Q48.

Solution

Concept: Secure protocols ensure encrypted communication over networks, protecting data from unauthorized access. HTTPS (Hypertext Transfer Protocol Secure) uses encryption techniques such as SSL/TLS to secure data transmission between client and server. This prevents interception and tampering, making it suitable for sensitive transactions like online banking.

Solution: The question asks for an example of a secure protocol. HTTPS is the secure version of HTTP and encrypts communication to protect data. HTTP, FTP, and Telnet do not provide encryption by default and are considered insecure for sensitive data transfer. Since HTTPS ensures confidentiality and integrity of transmitted data, it is the correct answer.

Final Answer: HTTPS

Answer: (C)

Q49.

Solution

Concept: Viruses and worms are both types of malware but differ in how they spread. A virus requires user action, such as opening a file, to infect a system. A worm, however, is self-replicating and spreads automatically across networks without user intervention. This makes worms more aggressive in spreading compared to viruses.

Solution: The question asks for the primary difference between a virus and a worm. A virus depends on user actions to spread, while a worm can replicate and spread independently across systems. The other options either provide incorrect distinctions or oversimplify the differences. Since the key difference lies in the method of propagation, the correct answer is that a virus requires human action, whereas a worm replicates automatically.

Final Answer: Virus needs user action; worm spreads automatically

Answer: (B)

Q50.

Solution

Concept: Cybersecurity threats often involve social engineering techniques where attackers manipulate users into revealing confidential data. One such common attack is phishing, where attackers impersonate trusted entities such as banks, companies, or services to trick users into providing sensitive information like usernames, passwords, or OTPs. It relies on deception rather than technical exploitation of systems.

Solution: The question describes an attempt to acquire sensitive information such as usernames and passwords by masquerading as a trustworthy entity. This clearly defines phishing, where attackers create fake emails, websites, or messages that appear legitimate to deceive users. Hacking refers to unauthorized access to systems, cracking involves breaking security protections or passwords using technical methods, and snooping refers to secretly monitoring data without necessarily impersonating anyone. Since the key idea is impersonation and deception to steal confidential information, phishing is the correct answer.

Final Answer: Phishing

Answer: (A)

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	C	2	B	3	C	4	D	5	B
6	D	7	C	8	B	9	B	10	C
11	C	12	B	13	C	14	C	15	A
16	B	17	A	18	C	19	B	20	A
21	B	22	C	23	C	24	C	25	B
26	D	27	C	28	B	29	C	30	B
31	C	32	C	33	C	34	B	35	A
36	C	38	C	39	B	40	A	41	C
42	C	43	C	44	B	45	B	46	B
47	C	48	C	49	B	50	A		