CUET-UG Computer Science Sample Paper-7

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 of the following SQL functions will return the remainder when one number is divided by another?

(A) REMAINDER()

(B) MOD()

(C) DIV()

(D) ROUND()

Q2. If the current date is '2026-05-15', what will the SQL command SELECT MONTHNAME(NOW()); return?

(A) 05

(B) May

(C) 15

(D) 2026

Q3. Which string function is used to return the position of the first occurrence of a substring within a string?

(A) POSITION()

(B) SEARCH()

(C) INSTR()

(D) LOCATE_SUB()

Q4. What will be the output of SELECT ROUND(15.678, 2);?

(A) 15.67

(B) 15.7

(C) 15.68

(D) 16.00

Q5. Which function is used to remove both leading and trailing spaces from a string in SQL?

(A) LTRIM()

(B) RTRIM()

(C) TRIM()

(D) STRIP()

Q6. What will SELECT MID('CUET-2026', 1, 4); return?

(A) CUET

(B) UET-

(C) 2026

(D) ET-2

Q7. Which of the following is an aggregate function in SQL?

(A) LENGTH()

(B) POWER()

(C) COUNT()

(D) UCASE()

Q8. To display the day of the week (e.g., Wednesday) for a specific date, which function should be used?

(A) WEEKDAY()

(B) DAY()

(C) DAYNAME()

(D) DATE_FORMAT()

Q9. In Relational Algebra, which operation is used to select a subset of columns from a relation?

(A) Selection ()

(B) Projection ()

(C) Join ()

(D) Cartesian Product (×)

Q10. A candidate key that is not chosen as the primary key is known as a/an:

(A) Foreign Key

(B) Composite Key

(C) Alternate Key

(D) Super Key

Q11. A table 'STUDENT' has attributes (RollNo, Name, Address, Phone). The 'RollNo' is the Primary Key. Which of the following statements is true regarding the Referential Integrity constraint if 'RollNo' is used as a Foreign Key in another table 'MARKS'?

(A) A value can be entered in the 'RollNo' column of 'MARKS' even if it does not exist in 'STUDENT'.

(B) A row cannot be deleted from 'STUDENT' if its 'RollNo' value exists in the 'MARKS' table.

(C) The 'RollNo' in the 'MARKS' table must be unique for every record.

(D) The Foreign Key column in the 'MARKS' table cannot contain NULL values.

Q12. Which relational algebra operation is used to combine all rows from two relations, excluding duplicates?

(A) Intersection

(B) Set Difference

(C) Union

(D) Cartesian Product

Q13. Which layer of the OSI model is responsible for end-to-end communication, error recovery, and flow control using protocols like TCP and UDP?

(A) Network Layer

(B) Data Link Layer

(C) Transport Layer

(D) Session Layer

Q14. Which network topology requires a central controller or hub to connect all nodes?

(A) Ring Topology

(B) Star Topology

(C) Bus Topology

(D) Mesh Topology

Q15. Which networking device operates at the Data Link Layer and is used to connect multiple segments of a network by learning MAC addresses?

(A) Hub

(B) Repeater

(C) Switch

(D) Gateway

Q16. What is the postfix form of the infix expression: (A + B) * C?

(A) A B + C *

(B) A B C + *

(C) * + A B C

(D) A + B C *

Q17. Which data structure follows the Last-In-First-Out (LIFO) principle?

(A) Queue

(B) Linked List

(C) Stack

(D) Array

Q18. In a circular queue, if Front == Rear + 1, what does it signify?

(A) The queue is empty.

(B) The queue is full.

(C) There is only one element.

(D) The queue has been reset.

Q19. Which operation is used to insert an element into a stack?

(A) Enqueue

(B) Pop

(C) Push

(D) Peek

Q20. While evaluating a postfix expression using a stack, what happens when an operator is encountered?

(A) It is pushed onto the stack.

(B) Two operands are popped, the operation is performed, and the result is pushed back.

(C) It is ignored.

(D) The stack is cleared.

Q21. A linear list of elements in which deletion can take place only from one end (front) and insertion can take place only from the other end (rear) is:

(A) Stack

(B) Queue

(C) Tree

(D) Linked List

Q22. If the stack size is 5 and we try to push a 6th element, the condition is called:

(A) Underflow

(B) Overflow

(C) Collision

(D) Garbage Collection

Q23. What is the result of the postfix expression: 5 3 2 * + 4 -?

(A) 7

(B) 12

(C) 11

(D) 8

Q24. Which Python data type is most commonly used to implement a Stack?

(A) Tuple

(B) Set

(C) List

(D) Dictionary

Q25. In a Queue implementation using a list, which method is typically used for 'Dequeue'?

(A) list.append()

(B) list.pop(0)

(C) list.remove()

(D) list.insert(0, value)

Q26. Which of the following is the prefix version of A + B?

(A) A B +

(B) + A B

(C) B A +

(D) A + B

Q27. Which sorting algorithm works by repeatedly swapping adjacent elements if they are in the wrong order?

(A) Selection Sort

(B) Insertion Sort

(C) Bubble Sort

(D) Quick Sort

Q28. Binary Search requires the input list to be:

(A) Unsorted

(B) Sorted

(C) Randomly distributed

(D) Small in size

Q29. What is the time complexity of Selection Sort in the average case?

(A) O(n)

(B) O(logn)

(C) O(n 2)

(D) O(nlogn)

Q30. Which sorting algorithm maintains a 'sorted part' and an 'unsorted part', and picks an element from the unsorted part to place it at the correct position in the sorted part?

(A) Bubble Sort

(B) Insertion Sort

(C) Linear Search

(D) Merge Sort

Q31. In a list of 1024 elements, what is the maximum number of comparisons required in a Binary Search?

(A) 1024

(B) 512

(C) 10

(D) 20

Q32. Which algorithm is most efficient for searching an element in a small, unsorted list?

(A) Binary Search

(B) Linear Search

(C) Bubble Search

(D) Hash Search

Q33. In Selection Sort, after the first pass, which element is guaranteed to be in its final sorted position?

(A) The largest element

(B) The smallest element

(C) The middle element

(D) None

Q34. If a list is already sorted, which sorting algorithm (standard implementation) will still take O(n 2) time?

(A) Selection Sort

(B) Optimized Bubble Sort

(C) Insertion Sort

(D) None of the above

Q35. The process of finding the location of a particular element in a list is called:

(A) Sorting

(B) Traversal

(C) Searching

(D) Indexing

Q36. Which block in Python is used to write code that must execute regardless of whether an exception occurred or not?

(A) except

(B) else

(C) finally

(D) catch

Q37. Which function is used to write a list of strings into a text file in one go?

(A) write()

(B) writelines()

(C) putlines()

(D) dump()

Q38. In Python File I/O, what does the 'r+' mode signify?

(A) Read-only mode

(B) Append-only mode

(C) Both Reading and Writing

(D) Binary reading

Q39. Which exception is raised when a local or global name is not found?

(A) ImportError

(B) NameError

(C) ValueError

(D) TypeError

Q40. To work with binary files in Python, which module is primarily used for serialization (pickling)?

(A) os

(B) sys

(C) pickle

(D) struct

Q41. What is the purpose of the tell() method in Python file handling?

(A) To tell the name of the file.

(B) To find the current position of the file pointer.

(C) To move the file pointer to a specific location.

(D) To count the number of lines in a file.

Q42. Which keyword is used to manually trigger an exception in Python?

(A) throw

(B) trigger

(C) raise

(D) error

Q43. When opening a file using with open(...) as f:, what is the primary benefit?

(A) It runs faster.

(B) It automatically closes the file after the block ends.

(C) It prevents any exceptions from occurring.

(D) It encrypts the file data.

Q44. Which protocol is used for securely transferring files between a client and a server over a network?

(A) HTTP

(B) FTP

(C) SMTP

(D) SNMP

Q45. What is the full form of HTTPS?

(A) HyperText Transfer Protocol Standard

(B) HyperText Transfer Protocol Secure

(C) High Transfer Text Protocol Service

(D) Hyperlink Transfer Protocol System

Q46. A self-replicating program that spreads by inserting copies of itself into other executable code or documents is called a:

(A) Trojan Horse

(B) Worm

(C) Virus

(D) Spyware

Q47. Which switching technique breaks data into small blocks and sends them independently across the network?

(A) Circuit Switching

(B) Message Switching

(C) Packet Switching

(D) Line Switching

Q48. What is a Firewall used for in a network?

(A) To increase the bandwidth.

(B) To prevent unauthorized access to or from a private network.

(C) To store backup data.

(D) To speed up data transmission.

Q49. Which of the following is a type of malware that appears to be useful software but actually performs malicious actions?

(A) Worm

(B) Adware

(C) Trojan Horse

(D) Cookie

Q50. In data communication, the number of bits transmitted per second is called:

(A) Bandwidth

(B) Frequency

(C) Baud Rate

(D) Data Transfer Rate (bps)

Detailed Solutions

Q1.

Solution

Concept: SQL provides arithmetic functions to perform operations like division and finding remainders.

Key Function:

- `MOD(a, b)` returns the remainder when a is divided by b

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Explanation:

- `REMAINDER()` is not a standard SQL function
- `DIV()` performs integer division (quotient only)
- `ROUND()` rounds numbers, not remainder

$$\text{Division} \xrightarrow[\text{MOD()}]{} \text{Remainder}$$

Final Answer: MOD()

Answer: (B)

Q2.

Solution

Concept: The SQL function `MONTHNAME()` returns the full name of the month from a given date (or current date using `NOW()`).

Given:

- Current date = 2026-05-15

Function Behavior:

- `NOW()` returns current date and time
- `MONTHNAME()` extracts the month name

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Explanation:

- Month = 05 → May

Date ⟶ Month Name

May

Final Answer: May

Answer: (B)

Solution

Concept: SQL string functions are used to manipulate and analyze text data. Functions that determine the position of a substring within a string are essential for pattern matching, searching, and data extraction tasks. These functions return the index where the substring first appears, enabling precise text processing.

Solution: The question asks for the function that returns the position of the first occurrence of a substring. Among the given options, INSTR() is a commonly used SQL function that returns the position of a substring within a string. While POSITION() may exist in some SQL standards, INSTR() is widely supported across databases like Oracle and MySQL. SEARCH() and LOCATE_SUB() are not standard SQL functions. Therefore, INSTR() correctly fulfills the requirement.

Final Answer: INSTR()

Answer: (C)

Q3.

Q4.

Solution

Concept: The SQL `ROUND()` function rounds a number to a specified number of decimal places.
Given:

$$\texttt{ROUND}(15.678, 2)$$

Rule:

- Look at the digit after 2 decimal places (i.e., 8)
- Since it is ≥ 5, round up the second decimal place

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Result:

$$15.678 \approx 15.68$$

$$15.678 \longrightarrow 15.68$$

Rounded

Final Answer: 15.68

Answer: (C)

Q5.

Solution

Concept: SQL provides string manipulation functions to clean and format text data. Removing unnecessary spaces is a common requirement in data processing. Functions like LTRIM() and RTRIM() remove spaces from one side, while TRIM() removes spaces from both the beginning and end of a string.
Solution: The question asks which function removes both leading and trailing spaces from a string. TRIM() is specifically designed for this purpose. LTRIM() removes only leading spaces, and RTRIM() removes only trailing spaces. STRIP() is not a standard SQL function. Therefore, TRIM() is the correct choice as it ensures that extra spaces from both ends of the string are eliminated, making the data clean and consistent for further processing.
Final Answer: TRIM()

Answer: (C)

Q6.

Solution

Concept: The SQL `MID()` (or `SUBSTRING()`) function extracts a substring from a string.

Syntax:

```
MID(string, start, length)
```

Given:

- String = `'CUET-2026'`
- Start position = 1
- Length = 4

Extraction:

- Starting from position 1 $\rightarrow$ C
- Next 4 characters $\rightarrow$ C U E T

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CUET-2026 $\longrightarrow$ CUET

First 4 chars

Final Answer: $\boxed{CUET}$

Answer: (A)

Q7.

Solution

Concept: Aggregate functions in SQL perform calculations on a set of values and return a single summarized result. These functions are commonly used with GROUP BY clauses to analyze data in databases. Examples include COUNT(), SUM(), AVG(), MIN(), and MAX(). Unlike scalar functions, which operate on individual values, aggregate functions process multiple rows to provide meaningful insights such as totals or counts.

Solution: The question asks which function is an aggregate function. Among the options, COUNT() is the correct choice because it counts the number of rows or non-null values in a column. LENGTH() returns the length of a string, POWER() calculates exponentiation, and UCASE() converts text to uppercase—these are all scalar functions. COUNT() is widely used in queries like SELECT COUNT(*) FROM table to determine the number of records. Hence, it is the only aggregate function listed among the options.

Final Answer: $\boxed{\text{COUNT()}}$

Answer: (C)

Q8.

Solution

Concept: In spreadsheet functions (like Excel/MySQL), different functions are used to extract parts of a date.

Function Roles:

- `WEEKDAY()` → Returns numeric day (1–7)
- `DAY()` → Returns day of month (1–31)
- `DAYNAME()` → Returns name of the day (e.g., Monday, Tuesday)
- `DATE_FORMAT()` → Custom formatting (more complex)

Key Requirement:

- To display the **name of the day** directly, use `DAYNAME()`

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$$\text{Date} \xrightarrow{\text{DAYNAME()}} \text{Day Name}$$

Final Answer: DAYNAME()

Answer: (C)

Q9.

Solution

Concept: Relational Algebra is a procedural query language used in database systems. It consists of operations that manipulate relations (tables). Projection () is used to select specific columns, while selection () filters rows. Other operations like join and Cartesian product combine relations. Projection reduces the number of attributes in a relation without affecting the number of rows.

Solution: The question asks which operation selects a subset of columns. Projection () is the correct operation because it extracts only the required attributes from a relation. Selection () works on rows, filtering tuples based on conditions. Join () combines two relations based on a condition, and Cartesian Product (×) combines all rows from two relations. Since the requirement is specifically about columns, projection is the appropriate relational algebra operation.

Final Answer: Projection ()

Answer: (B)

Q10.

Solution

Concept: In relational databases, a candidate key uniquely identifies records in a table. When multiple candidate keys exist, one is selected as the primary key. The remaining candidate keys are called alternate keys. These keys still maintain uniqueness but are not chosen as the main identifier for the table.

Solution: The question asks what a candidate key not chosen as the primary key is called. Such keys are known as alternate keys. A foreign key is used to establish relationships between tables, a composite key consists of multiple attributes, and a super key is any set of attributes that uniquely identifies a record. Since alternate keys are specifically the unused candidate keys, they correctly match the definition provided in the question.

Final Answer: Alternate Key

Answer: (C)

Q11.

Solution

Concept: Referential integrity ensures consistency between related tables in a database. A foreign key in one table must match a primary key in another table or be NULL. This constraint prevents invalid data entries and maintains logical relationships between tables, ensuring that dependent data remains accurate and consistent.

Solution: The question involves a primary key 'RollNo' in STUDENT and its use as a foreign key in MARKS. Referential integrity ensures that any value in the MARKS table must correspond to an existing value in the STUDENT table. Additionally, if a RollNo exists in MARKS, the corresponding row in STUDENT cannot be deleted, as it would break the relationship. Option (A) is incorrect because foreign keys must reference existing values. Option (C) is incorrect because foreign keys need not be unique. Option (D) is incorrect because foreign keys can contain NULL values unless restricted. Therefore, the correct statement is that a row cannot be deleted from STUDENT if it is referenced in MARKS.

Final Answer: A row cannot be deleted from STUDENT if its RollNo exists in MARKS

Answer: (B)

Q12.

Solution

Concept: Relational Algebra includes set operations such as union, intersection, and set difference. The union operation combines tuples from two relations while eliminating duplicates. It requires both relations to be union-compatible, meaning they must have the same number of attributes and compatible data types.

Solution: The question asks which operation combines all rows from two relations without duplicates. The union operation performs exactly this function by merging tuples from both relations and removing duplicate entries. Intersection returns only common rows, set difference returns rows present in one relation but not the other, and Cartesian product combines all possible pairs of rows. Therefore, union is the correct operation for combining relations while excluding duplicates.

Final Answer: Union

Answer: (C)

Q13.

Solution

Concept: The OSI model divides network communication into layers, each responsible for specific tasks. The Transport Layer ensures reliable end-to-end communication between devices. It manages flow control, error detection and correction, and segmentation of data. Protocols like TCP provide reliable communication, while UDP offers faster, connectionless transmission without guaranteed delivery.

Solution: The question asks which OSI layer is responsible for end-to-end communication, error recovery, and flow control. The Transport Layer performs these functions by ensuring that data sent from one host reaches another accurately and efficiently. TCP (Transmission Control Protocol) handles reliability, acknowledgments, and retransmissions, while UDP (User Datagram Protocol) provides faster but less reliable communication. Other layers such as the Network Layer deal with routing, and the Data Link Layer manages node-to-node communication. Therefore, the Transport Layer is the correct answer.

Final Answer: Transport Layer

Answer: (C)

Q14.

Solution

Concept: Network topology defines how devices are arranged and connected in a network. In a star topology, all nodes are connected to a central device such as a hub or switch. This central controller manages communication between nodes, making the system easy to manage but dependent on the central device.

Solution: The question asks which topology requires a central controller. In a star topology, every device is connected to a central hub or switch, and all communication passes through this device. If the central device fails, the entire network is affected. In contrast, ring topology connects nodes in a circular fashion, bus topology uses a single backbone cable, and mesh topology connects nodes directly to each other. Therefore, the topology that requires a central controller is the star topology.

Final Answer: Star Topology

Answer: (B)

Q15.

Solution

Concept: Networking devices operate at different layers of the OSI model.

Data Link Layer (Layer 2):

- Works with MAC (Media Access Control) addresses
- Responsible for frame forwarding within a network

Device Identification:

- **Switch** operates at Data Link Layer
- Learns MAC addresses of connected devices
- Forwards frames intelligently to the correct port

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Why Others are Incorrect:

- Hub $\rightarrow$ Physical layer, no intelligence
- Repeater $\rightarrow$ Amplifies signals only
- Gateway $\rightarrow$ Works at higher layers (protocol conversion)

$$\text{MAC Address} \longrightarrow \text{Switch}$$

Data Link Layer

Final Answer: Switch

Answer: (C)

Q16.

Solution

Concept: In postfix notation, operators come **after** their operands, and parentheses are removed by respecting precedence.

Given Expression:

$$(A + B) * C$$

Step-wise Conversion:

- First evaluate inside parentheses: $A + B \rightarrow AB+$
- Then multiply with C: $(AB+)C \rightarrow AB + C*$

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Explanation:

- '+' is applied to A and B first
- '*' is applied to result and C

Infix	$\longrightarrow$	Postfix
$(A + B) * C$		$AB + C*$

Final Answer: $A\ B\ +\ C\ *$

Answer: (A)

Q17.

Solution

Concept: Data structures organize data for efficient access and manipulation. A stack follows the Last-In-First-Out (LIFO) principle, meaning the last element inserted is the first one removed. Operations like push and pop are used to add and remove elements, making stacks useful in recursion, expression evaluation, and backtracking.

Solution: The question asks which data structure follows the LIFO principle. A stack is specifically designed for this behavior. When elements are added (pushed), they are placed on top, and removal (pop) also occurs from the top. In contrast, a queue follows FIFO, a linked list allows flexible insertion and deletion, and an array is a general structure without LIFO constraints. Therefore, the stack is the correct answer.

Final Answer: Stack

Answer: (C)

Q18.

Solution

Concept: A circular queue is a linear data structure where the last position connects back to the first, forming a circle. It efficiently utilizes space by reusing empty slots. The condition for a full queue is typically when the next position of rear equals front, indicating no more space is available for insertion.

Solution: In a circular queue, the condition Front == Rear + 1 (considering modular arithmetic) indicates that the queue is full. This happens because the rear pointer has reached just before the front pointer, leaving no empty space for new elements. If the queue were empty, front and rear would have different conditions such as both being -1 or equal depending on implementation. Hence, the given condition clearly represents a full queue.

Final Answer: The queue is full

Answer: (B)

Q19.

Solution

Concept: A stack is a linear data structure that follows the Last-In-First-Out (LIFO) principle. Elements are added and removed only from one end called the top. The primary operations associated with a stack are push (insertion), pop (deletion), and peek (viewing the top element). These operations are widely used in recursion, expression evaluation, and backtracking algorithms.

Solution: The question asks which operation is used to insert an element into a stack. In stack terminology, inserting an element is called the push operation. When a new element is pushed, it is placed on top of the existing elements. Enqueue is used in queues, pop removes an element from the stack, and peek only views the top element without removing it. Therefore, push is the correct operation used for insertion in a stack.

Final Answer: Push

Answer: (C)

Q20.

Solution

Concept: Postfix expression evaluation uses a stack to process operands and operators efficiently. Operands are pushed onto the stack, while operators trigger operations on the top elements. This method eliminates the need for parentheses and follows a clear evaluation order, making it suitable for computer-based calculations and compiler design.

Solution: When evaluating a postfix expression, operands are first pushed onto the stack. When an operator is encountered, the top two operands are popped from the stack, and the operator is applied to them in the correct order. The result of this operation is then pushed back onto the stack. This process continues until the entire expression is evaluated. Options like pushing the operator or ignoring it are incorrect. Hence, the correct behavior is popping two operands, performing the operation, and pushing the result back.

Final Answer: Two operands are popped, operation performed, result pushed back

Answer: (B)

Q21.

Solution

Concept: A queue is a linear data structure that follows the First-In-First-Out (FIFO) principle. In this structure, elements are inserted at the rear and removed from the front. This arrangement ensures that the earliest inserted element is processed first. Queues are commonly used in scheduling, buffering, and real-time data processing systems.

Solution: The question describes a structure where insertion occurs at the rear and deletion occurs at the front. This behavior matches a queue. A stack allows both insertion and deletion from the same end, a tree is a hierarchical structure, and a linked list is a general structure without strict insertion/deletion rules. Therefore, the structure described is a queue, which follows FIFO order and supports operations like enqueue (insert) and dequeue (delete).

Final Answer: Queue

Answer: (B)

Q22.

Solution

Concept: In stack operations, overflow and underflow are important conditions. Overflow occurs when an attempt is made to insert an element into a full stack, while underflow happens when trying to remove an element from an empty stack. These conditions help in error handling and maintaining proper stack operations within defined memory limits.

Solution: The question states that the stack size is 5 and a 6th element is being pushed. Since the stack has reached its maximum capacity, inserting another element is not possible. This condition is known as stack overflow. Underflow would occur if we tried to pop from an empty stack, which is not the case here. Collision and garbage collection are unrelated concepts. Hence, the correct term for this situation is overflow.

Final Answer: Overflow

Answer: (B)

Q23.

Solution

Concept: Postfix (Reverse Polish) expressions are evaluated using a stack:

- Push operands onto stack
- On operator, pop two elements, apply operation, push result

Given Expression:

$$5\ 3\ 2\ *\ +\ 4\ -$$

Step-by-step Evaluation:

- Push 5, 3, 2
- $3 \times 2 = 6$
- Stack: 5, 6
- $5 + 6 = 11$
- Stack: 11
- $11 - 4 = 7$

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$$5\ 3\ 2 \longrightarrow \text{Result}$$

$$= 7$$

Final Answer: 7

Answer: (A)

Q24.

Solution

Concept: In Python, stacks are commonly implemented using built-in data structures. A list is the most suitable choice because it supports dynamic resizing and provides methods like append() and pop() to simulate push and pop operations. This makes it efficient and easy to use for stack implementation in Python programming.

Solution: The question asks which Python data type is most commonly used to implement a stack. A list is the correct answer because it allows insertion and deletion at the end using append() and pop() methods, which correspond to push and pop operations. Tuples are immutable, sets are unordered, and dictionaries store key-value pairs. Therefore, lists provide the most practical and flexible way to implement stacks in Python.

Final Answer: List

Answer: (C)

Q25.

Solution

Concept: A queue follows the First-In-First-Out (FIFO) principle where insertion occurs at the rear and deletion at the front. In Python, lists are often used to implement queues. The append() method adds elements to the rear, while removing elements from the front requires shifting elements, which can be done using pop(0), though it is less efficient.

Solution: The question asks which method is used for dequeue operation in a list-based queue. Dequeue removes the element from the front of the queue. In Python lists, the front element is at index 0, so removing it requires the use of list.pop(0). The append() method adds elements to the end, remove() deletes a specific value, and insert() adds elements at a given position. Therefore, list.pop(0) correctly performs the dequeue operation.

Final Answer: list.pop(0)

Answer: (B)

Q26.

Solution

Concept: In prefix notation (Polish notation), the operator is placed **before** the operands.

Given Expression:

$$A + B$$

Conversion Rule:

- Infix: Operand Operator Operand
- Prefix: Operator Operand Operand

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Explanation:

- '+' comes before A and B
- Order of operands remains same

Infix	$\longrightarrow$	Prefix
$A + B$		$+AB$

Final Answer: $+ A B$

Answer: (B)

Q27.

Solution

Concept: Sorting algorithms arrange elements in a specific order. Bubble Sort is a simple algorithm that repeatedly compares adjacent elements and swaps them if they are in the wrong order. This process continues until the list is sorted. Although inefficient for large datasets, it is easy to understand and implement.

Solution: The question asks which algorithm swaps adjacent elements repeatedly. Bubble Sort works by comparing each pair of adjacent elements and swapping them if necessary, causing larger elements to "bubble up" to the end. Selection Sort selects the minimum element, Insertion Sort places elements in correct position, and Quick Sort uses divide-and-conquer strategy. Hence, Bubble Sort is the correct answer.

Final Answer: Bubble Sort

Answer: (C)

Q28.

Solution

Concept: Binary Search is an efficient searching algorithm that repeatedly divides the search space into halves. It works only on sorted data because it relies on comparing the target value with the middle element to decide which half to discard. This reduces the search time significantly compared to linear search.

Solution: The question asks the requirement for binary search. Since binary search eliminates half of the elements based on comparisons, the list must be sorted to ensure correctness. If the list is unsorted, comparisons will not provide meaningful direction. Therefore, sorted input is essential for binary search to function properly.

Final Answer: Sorted

Answer: (B)

Q29.

Solution

Concept: Selection Sort repeatedly selects the minimum element from the unsorted portion and places it at the beginning.

Key Idea:

- For each element, we scan the remaining list
- Number of comparisons:

$$(n-1) + (n-2) + \cdots + 1$$

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Time Complexity:

- Total comparisons $\approx \frac{n(n-1)}{2}$
- This simplifies to $O(n^2)$
- Same for best, average, and worst case

$$n \text{ elements} \longrightarrow n^2 \text{ comparisons}$$

Selection Sort

Final Answer: $O(n^2)$

Answer: (C)

Q30.

Solution

Concept: Insertion Sort works by dividing the list into a sorted and an unsorted part. It picks one element at a time from the unsorted portion and inserts it into its correct position in the sorted portion. This makes it efficient for small datasets and nearly sorted lists.

Solution: The question describes an algorithm that maintains sorted and unsorted parts. Insertion Sort follows this exact approach by taking elements one by one and inserting them into the correct position in the sorted section. Bubble Sort compares adjacent elements, Linear Search is not a sorting algorithm, and Merge Sort uses divide-and-conquer. Therefore, the correct answer is Insertion Sort.

Final Answer: Insertion Sort

Answer: (B)

Q31.

Solution

Concept: Binary Search reduces the search space by half in each step. Maximum comparisons are given by:

$$\text{Comparisons} = \log_2 n$$

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Calculation:

$$1024 = 2^{10} \Rightarrow \log_2(1024) = 10$$

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Explanation:

- Each comparison halves the list
- After 10 steps, only 1 element remains

$$1024 \xrightarrow{10 \text{ steps}} 1 \text{ element}$$

Final Answer: 10

Answer: (C)

Q32.

Solution

Concept: Searching algorithms vary in efficiency depending on the data structure and size of the dataset. Linear Search checks each element sequentially and works well for small or unsorted lists. Binary Search is faster but requires sorted data, making it unsuitable for unsorted lists without preprocessing.

Solution: The question asks for the most efficient algorithm for a small, unsorted list. Linear Search is ideal because it does not require sorting and has minimal overhead for small datasets. Binary Search cannot be applied directly to unsorted data, Bubble Search is not a standard algorithm, and Hash Search requires additional data structures. Therefore, Linear Search is the most practical and efficient choice in this scenario.

Final Answer: Linear Search

Answer: (B)

Q33.

Solution

Concept: Selection Sort works by repeatedly finding the minimum element from the unsorted portion and placing it at the beginning. After each pass, the sorted portion grows from the left. This guarantees that at least one element is correctly positioned after every iteration.

Solution: During the first pass of Selection Sort, the smallest element in the list is identified and swapped with the first element. As a result, the smallest element is placed in its correct sorted position. The largest element is not necessarily placed correctly in the first pass. Therefore, the element guaranteed to be in its final position after the first pass is the smallest element.

Final Answer: The smallest element

Answer: (B)

Q34.

Solution

Concept: Sorting algorithms differ in performance based on input conditions. Selection Sort always performs the same number of comparisons regardless of input order, resulting in $O(n^2)$ time complexity in all cases. Other algorithms like Insertion Sort can perform better on already sorted data, reducing their time complexity to O(n).

Solution: The question asks which algorithm still takes $O(n^2)$ time even if the list is already sorted. Selection Sort does not benefit from pre-sorted data because it still scans the entire unsorted portion to find the minimum element in each pass. Optimized Bubble Sort and Insertion Sort can terminate early or run in linear time for sorted inputs. Therefore, Selection Sort is the correct answer.

Final Answer: Selection Sort

Answer: (A)

Q35.

Solution

Concept: Data operations include searching, sorting, and traversal. Searching refers to locating a specific element within a dataset. It can be performed using algorithms like Linear Search or Binary Search. Efficient searching is essential for quick data retrieval in applications and databases.

Solution: The question asks what the process of finding the location of an element in a list is called. This operation is known as searching. Sorting arranges elements in order, traversal refers to visiting each element, and indexing is related to accessing elements by position. Since the task is to locate an element, the correct term is searching.

Final Answer: Searching

Answer: (C)

Q36.

Solution

Concept: Exception handling in Python uses blocks like try, except, else, and finally. The finally block is always executed regardless of whether an exception occurs or not. It is typically used for cleanup operations such as closing files or releasing resources.

Solution: The question asks which block executes regardless of exceptions. The finally block ensures that certain code runs whether an error occurs or not. The except block runs only when an exception occurs, else runs when no exception occurs, and catch is not used in Python. Therefore, the correct answer is finally.

Final Answer: finally

Answer: (C)

Q37.

Solution

Concept: File handling functions allow writing data into text files.
Key Functions:

- `write()` → writes a single string
- `writelines()` → writes a list of strings at once

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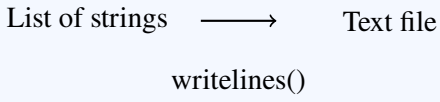
Explanation:

- `writelines()` takes an iterable (like a list)
- Writes each string sequentially into the file
- Does not automatically add newline characters



Final Answer: writelines()

Answer: (B)

Q38.

Solution

Concept: File modes in Python determine how a file is opened and what operations can be performed. Modes like 'r', 'w', and 'a' define reading, writing, and appending. Adding '+' allows both reading and writing. Understanding file modes is essential for safely manipulating file content without data loss.
Solution: The 'r+' mode opens a file for both reading and writing. It does not truncate the file and allows modification of existing content. Unlike 'r' (read-only) or 'a' (append-only), 'r+' provides flexibility for updating file data. Binary modes use 'b', not '+'. Therefore, the correct interpretation of 'r+' is that it enables both reading and writing operations on the file.
Final Answer: Both Reading and Writing

Answer: (C)

Q39.

Solution

Concept: Python raises different exceptions to indicate specific runtime errors. A NameError occurs when a variable or function name is used before it is defined or is not available in the current scope. Proper exception handling helps in debugging and writing robust programs.

Solution: The question asks which exception is raised when a name is not found. When Python encounters an undefined variable or identifier, it raises a NameError. ImportError occurs during module import failure, ValueError arises from invalid values, and TypeError occurs when operations are applied to incompatible data types. Since the issue is related to undefined names, NameError is the correct answer.

Final Answer: NameError

Answer: (B)

Q40.

Solution

Concept: Serialization is the process of converting Python objects into a byte stream for storage or transmission.

Key Module:

- `pickle` module is used for serialization (pickling) and deserialization (unpickling)

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Explanation:

- `pickle.dump()` → writes object to binary file
- `pickle.load()` → reads object from binary file

Why Others are Incorrect:

- `os`, `sys` → system-related modules
- `csv` → handles CSV files (text-based)
- `struct` → deals with binary data formats, not full object serialization

$$\text{Python Object} \xrightarrow{\text{pickle}} \text{Binary File}$$

Final Answer: pickle

Answer: (C)

Q41.

Solution

Concept: File handling in Python involves managing the file pointer, which indicates the current position in a file. Methods like seek() and tell() help control and track this position. tell() is used to determine where the pointer is currently located, which is useful during read/write operations.

Solution: The question asks the purpose of the tell() method. The tell() method returns the current position of the file pointer in terms of bytes from the beginning of the file. This helps in tracking progress while reading or writing. It does not move the pointer (that is done by seek()), nor does it provide file names or line counts. Therefore, the correct answer is that it finds the current position of the file pointer.

Final Answer: To find the current position of the file pointer

Answer: (B)

“

Q42.

Solution

Concept: Exception handling in Python allows programmers to manage runtime errors effectively. The language provides mechanisms to raise exceptions manually when certain conditions occur. This helps in enforcing rules, validating input, and ensuring program correctness by interrupting normal execution when an error condition is detected.

Solution: The question asks which keyword is used to manually trigger an exception. In Python, the `raise` keyword is used to explicitly generate an exception. It allows the programmer to define custom error messages or raise built-in exceptions when needed. Other options like throw or trigger are not valid Python keywords, and error is not used for raising exceptions. Therefore, `raise` is the correct choice for manually initiating exceptions in Python.

Final Answer: raise

Answer: (C)

Q43.

Solution

Concept: Python provides context managers using the `with` statement to handle resources efficiently. When working with files, the `with open()` construct ensures proper management of file resources. It simplifies code and prevents issues like forgetting to close files, which can lead to memory leaks or data corruption.

Solution: The primary benefit of using `with open(...) as f:` is that it automatically closes the file once the block of code is executed, even if an exception occurs. This ensures proper resource management without requiring an explicit `close()` call. Other options like faster execution, exception prevention, or encryption are incorrect. Therefore, automatic file closure is the key advantage of using the `with` statement in Python file handling.

Final Answer: It automatically closes the file after the block ends

Answer: (B)

Q44.

Solution

Concept: Different network protocols are used for different purposes such as web access, email, monitoring, and file transfer.

Key Point:

- **FTP (File Transfer Protocol)** is used to transfer files between a client and a server
- Secure versions include **SFTP** and **FTPS**

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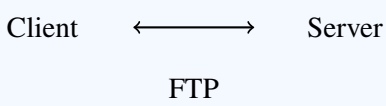
Explanation of Options:

- HTTP → Used for web pages
- FTP → File transfer protocol
- SMTP → Email sending protocol
- SNMP → Network monitoring protocol



Final Answer: FTP

Answer: (B)

Q45.

Solution

Concept: HTTPS is an extension of HTTP that provides secure communication over a network. It uses encryption protocols like SSL/TLS to ensure confidentiality, integrity, and authentication of data exchanged between a client and a server. This is essential for protecting sensitive information such as passwords and financial data.

Solution: The full form of HTTPS is HyperText Transfer Protocol Secure. It enhances HTTP by adding a security layer that encrypts data during transmission. Other options either misrepresent the acronym or include incorrect terms. Therefore, the correct expansion of HTTPS is HyperText Transfer Protocol Secure.

Final Answer: HyperText Transfer Protocol Secure

Answer: (B)

Q46.

Solution

Concept: Malware includes various types of malicious software designed to harm or exploit systems. A virus is a self-replicating program that attaches itself to other files or programs and spreads when executed. Unlike worms, which spread independently, viruses require a host file to propagate.

Solution: The question describes a program that replicates itself by inserting copies into other executable files or documents. This behavior is characteristic of a virus. A worm spreads independently across networks, a Trojan disguises itself as legitimate software, and spyware collects user information. Since the defining feature is self-replication within host programs, the correct answer is virus.

Final Answer: Virus

Answer: (C)

Q47.

Solution

Concept: Switching techniques are used in networks to transmit data efficiently. Packet switching divides data into smaller units called packets, which are sent independently across the network. Each packet may take a different path and is reassembled at the destination. This method improves efficiency, reliability, and optimal use of network resources compared to dedicated circuit paths.

Solution: The question asks which switching technique breaks data into small blocks and sends them independently. Packet switching performs this function by dividing messages into packets and transmitting them separately. Circuit switching establishes a dedicated path, while message switching sends entire messages at once. Line switching is not a standard technique. Therefore, packet switching is the correct answer as it enables flexible and efficient data transmission.

Final Answer: Packet Switching

Answer: (C)

Q48.

Solution

Concept: A firewall is a network security system designed to monitor and control incoming and outgoing network traffic. It acts as a barrier between a trusted internal network and untrusted external networks. Firewalls enforce security rules to block unauthorized access while allowing legitimate communication.

Solution: The question asks the purpose of a firewall. A firewall is primarily used to prevent unauthorized access to or from a private network. It filters traffic based on predefined security rules. It does not increase bandwidth, store backup data, or directly speed up transmission. Therefore, the correct answer is that a firewall protects a network by controlling access and ensuring security.

Final Answer: To prevent unauthorized access to or from a private network

Answer: (B)

Q49.

Solution

Concept: Malware refers to malicious software designed to harm or exploit systems. A Trojan Horse is a type of malware that disguises itself as legitimate or useful software to trick users into installing it. Once executed, it performs hidden malicious activities such as data theft or system damage.

Solution: The question describes software that appears useful but performs harmful actions. This is characteristic of a Trojan Horse. Worms spread independently, adware displays unwanted advertisements, and cookies store user data for websites. Since the key feature is deception and hidden malicious intent, Trojan Horse is the correct answer.

Final Answer: Trojan Horse

Answer: (C)

Q50.

Solution

Concept: In data communication, the speed of transmission is measured in bits per second (bps).
Definition:

- **Data Transfer Rate** = Number of bits transmitted per second (bps)

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Explanation of Options:

- Bandwidth → Capacity of channel (range of frequencies)
- Frequency → Cycles per second (Hz)
- Baud Rate → Symbols per second (may differ from bits/sec)
- Data Transfer Rate → Actual bits transmitted per second

$$\text{Bits} \longrightarrow \text{Time}$$

$$\text{bps}$$

Final Answer: Data Transfer Rate (bps)

Answer: (D)

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	B	2	B	3	C	4	C	5	C
6	A	7	C	8	C	9	B	10	C
11	B	12	C	13	C	14	B	15	C
16	A	17	C	18	B	19	C	20	B
21	B	22	B	23	A	24	C	25	B
26	B	27	C	28	B	29	C	30	B
31	C	32	B	33	B	34	A	35	C
36	C	37	B	38	C	39	B	40	C
41	B	42	C	43	B	44	B	45	B
46	C	47	C	48	B	49	C	50	D