

CUET-UG Computer Science Sample Paper-16

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 position of a substring within a string, returning 0 if not found?

- (A) LOCATE()
- (B) POSITION()
- (C) INSTR()
- (D) SEARCH()

Q2. What will be the output of the following SQL query: `SELECT ROUND(152.438, -2);`

- (A) 152.44
- (B) 150
- (C) 200
- (D) 100

Q3. Which function would you use to display the name of the day (e.g., 'Monday') for a given date?

- (A) DAYNAME()
- (B) WEEKDAY()
- (C) DAYOFWEEK()
- (D) DATE_STRING()



- Q4.** Which SQL function returns the number of characters in a string, excluding trailing spaces in some dialects but generally measuring length?
- (A) SIZE()
 - (B) CHAR_LENGTH()
 - (C) LEN()
 - (D) COUNT()
- Q5.** What is the result of `SELECT TRUNCATE(15.79, 1);`
- (A) 15.8
 - (B) 15.7
 - (C) 16.0
 - (D) 15
- Q6.** Which function is used to extract a specific number of characters from a string starting from the middle?
- (A) SUBSTR()
 - (B) LEFT()
 - (C) RIGHT()
 - (D) TRIM()
- Q7.** To calculate the value of 3^4 in SQL, which function is appropriate?
- (A) EXP(3,4)
 - (B) POWER(3,4)
 - (C) SQUARE(3,4)
 - (D) MATH(3,4)
- Q8.** What does the `MONTH()` function return for the date '2026-12-25'?
- (A) December
 - (B) 12



- (C) 25
- (D) 2026

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

- (A) Selection (σ)
- (B) Projection (π)
- (C) Cartesian Product (\times)
- (D) Join (\bowtie)

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

- (A) Foreign Key
- (B) Super Key
- (C) Alternate Key
- (D) Composite Key

Q11. Which constraint ensures that no two rows in a table have the same value in a specific column, but allows a single NULL?

- (A) Primary Key
- (B) Unique
- (C) Check
- (D) Default

Q12. The number of attributes in a relation is called its _____, and the number of tuples is called its _____.

- (A) Cardinality, Degree
- (B) Degree, Cardinality
- (C) Range, Domain
- (D) Instance, Schema



- Q13.** Which network topology is highly reliable because every node is connected to every other node?
- (A) Star
 - (B) Mesh
 - (C) Bus
 - (D) Tree
- Q14.** A MAC address is a _____ address, while an IP address is a _____ address.
- (A) Logical, Physical
 - (B) Temporary, Permanent
 - (C) Physical, Logical
 - (D) Global, Local
- Q15.** Which networking device is used to connect two different networks having different protocols?
- (A) Switch
 - (B) Hub
 - (C) Gateway
 - (D) Repeater
- Q16.** What is the postfix equivalent of the infix expression: $(A + B) * (C - D)$
- (A) $AB+CD-*$
 - (B) $ABCD+-*$
 - (C) $+AB*-CD$
 - (D) $AB+*CD-$
- Q17.** In a Stack, if the elements 'A', 'B', and 'C' are pushed in order, what is the order of elements when popped?
- (A) A, B, C



- (B) C, B, A
- (C) B, A, C
- (D) A, C, B

Q18. Which data structure follows the FIFO (First-In-First-Out) principle?

- (A) Stack
- (B) Queue
- (C) Tree
- (D) Binary Search Tree

Q19. In a Queue implemented using a list, which operation is most efficient for 'Enqueue'?

- (A) `list.insert(0, val)`
- (B) `list.append(val)`
- (C) `list.pop()`
- (D) `list.remove(val)`

Q20. What is the result of evaluating the postfix expression: $5\ 2\ 3\ * + 8\ -$

- (A) 11
- (B) 3
- (C) 13
- (D) 5

Q21. A condition where one tries to pop an element from an empty stack is called:

- (A) Overflow
- (B) Underflow
- (C) Garbage Collection
- (D) Null Pointer



- Q22.** Which pointer is used to track the top element in a Stack?
- (A) Front
 - (B) Rear
 - (C) Top
 - (D) Head
- Q23.** In a Circular Queue, if $\text{Front} == \text{Rear}$, what does it signify?
- (A) Queue is Full
 - (B) Queue is Empty
 - (C) Queue has one element
 - (D) Both (A) or (B) depending on implementation
- Q24.** The conversion of Infix to Postfix generally uses which data structure?
- (A) Queue
 - (B) Stack
 - (C) Linked List
 - (D) Array
- Q25.** In a Queue, insertion is done at the ____ end and deletion at the ____ end.
- (A) Rear, Front
 - (B) Front, Rear
 - (C) Top, Bottom
 - (D) Bottom, Top
- Q26.** Which Python method is used to remove and return the last element added to a list (Stack implementation)?
- (A) `remove()`
 - (B) `delete()`
 - (C) `pop()`



(D) discard()

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 list to be in _____ order.

(A) Random

(B) Sorted

(C) Descending only

(D) Reverse

Q29. What is the best-case time complexity of a Linear Search?

(A) $O(n)$

(B) $O(1)$

(C) $O(\log n)$

(D) $O(n^2)$

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

(A) The largest element

(B) The smallest element

(C) The middle element

(D) No element is guaranteed

Q31. Which sorting algorithm "inserts" an element into its correct position in a growing sorted sub-list?



- (A) Bubble Sort
- (B) Quick Sort
- (C) Insertion Sort
- (D) Selection Sort

Q32. What is the maximum number of comparisons for a Binary Search in a list of 10 elements?

- (A) 10
- (B) 5
- (C) 4
- (D) 2

Q33. Which sorting algorithm has a worst-case time complexity of $O(n^2)$?

- (A) Bubble Sort
- (B) Selection Sort
- (C) Insertion Sort
- (D) All of the above

Q34. In a linear search, if the element is at the very end of a list of size N , how many comparisons are made?

- (A) 1
- (B) $N/2$
- (C) N
- (D) $N - 1$

Q35. Which search algorithm follows the 'Divide and Conquer' strategy?

- (A) Linear Search
- (B) Binary Search
- (C) Sequential Search



(D) Iterative Search

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 file at once?

(A) write()

(B) writelines()

(C) dump()

(D) put()

Q38. To work with Binary files in Python, which module must be imported for pickling?

(A) os

(B) math

(C) pickle

(D) binary

Q39. What is the default mode when opening a file using the open() function?

(A) 'w'

(B) 'a'

(C) 'r'

(D) 'rb'

Q40. Which exception is raised when a file to be opened for reading does not exist?



- (A) IOError
- (B) FileNotFoundError
- (C) NameError
- (D) ValueError

Q41. The `seek()` method is used to:

- (A) Find the current position of the pointer
- (B) Move the file pointer to a specific position
- (C) Search for a string in a file
- (D) Close the file pointer

Q42. Which function is used to read all remaining lines from a file and return them as a list?

- (A) `read()`
- (B) `readline()`
- (C) `readlines()`
- (D) `load()`

Q43. What does the 'a' mode do in file handling?

- (A) Overwrites existing content
- (B) Opens for reading only
- (C) Adds new data to the end of the file
- (D) Creates a new file only if it doesn't exist

Q44. Which protocol is used for sending emails over the network?

- (A) POP3
- (B) HTTP
- (C) SMTP
- (D) FTP



- Q45.** A program that spreads by self-replicating but does not need to attach itself to an existing program is called a:
- (A) Virus
 - (B) Worm
 - (C) Trojan Horse
 - (D) Spyware
- Q46.** Which switching technique divides data into small blocks and sends them independently?
- (A) Circuit Switching
 - (B) Message Switching
 - (C) Packet Switching
 - (D) Frequency Switching
- Q47.** In which method of data communication is a dedicated physical path established between the sender and the receiver before the actual data transfer begins?
- (A) Packet Switching
 - (B) Message Switching
 - (C) Circuit Switching
 - (D) Virtual Circuit Switching
- Q48.** Which malware appears as useful software but performs malicious actions behind the scenes?
- (A) Adware
 - (B) Trojan Horse
 - (C) Ransomware
 - (D) Cookies
- Q49.** The process of converting plain text into unreadable format to secure it is called:



- (A) Decryption
- (B) Encryption
- (C) Firewalling
- (D) Routing

Q50. Which protocol is primarily used for transferring files between a client and a server?

- (A) Telnet
- (B) TCP/IP
- (C) FTP
- (D) SNMP



Detailed Solutions

Q1.

Solution

Concept: In SQL, string functions are used to perform operations like searching, extracting, and manipulating text data. To find the position of a substring within a string, different database systems provide functions such as INSTR(), LOCATE(), and POSITION(). These functions return the numeric position of the substring if it exists. If the substring is not found, some functions return 0, making them useful for conditional searching and validation in queries.

Solution: Among the given options, INSTR() is widely used in databases like Oracle and MySQL to return the position of a substring within a string. It returns the index of the first occurrence of the substring. If the substring is not found, it returns 0, which makes it easy to handle search failures in queries. LOCATE() is also used in MySQL, but INSTR() is the most standard answer expected in such MCQs. POSITION() is part of standard SQL but does not always behave the same across systems, and SEARCH() is not a valid SQL function. Therefore, INSTR() is the most appropriate choice.

Final Answer: INSTR()

Answer: (C)



Q3.

Solution

Concept: SQL provides date functions to extract different parts of a date such as day, month, year, and day name.

Key Function:

- DAYNAME() returns the name of the day (e.g., Monday, Tuesday)

Explanation of Options:

- DAYNAME() → returns full day name (correct)
- WEEKDAY() → returns numeric index of day (0–6)
- DAYOFWEEK() → returns numeric position of day (1–7)
- DATESTRING() *is not a valid SQL function*

Date → Monday
DAYNAME()

Final Answer: DAYNAME()

Answer: (A)

Q4.

Solution

Concept: In SQL, character or string length functions are used to determine the number of characters in a given string. These functions may behave slightly differently across database systems, especially regarding spaces and multibyte characters. Common functions include CHAR_LENGTH(), LENGTH(), and LEN(), each serving similar purposes in different SQL dialects.

Solution: The function CHAR_LENGTH() is used in SQL to return the number of characters in a string. In many systems like MySQL, it counts characters rather than bytes and may ignore trailing spaces depending on context. LEN() is used in SQL Server, while SIZE() and COUNT() are not appropriate for string length measurement. Therefore, CHAR_LENGTH() is the most correct and standard answer among the options provided.

Final Answer: CHAR_LENGTH()

Answer: (B)



Q5.

Solution

Concept: The SQL TRUNCATE() function removes digits after the specified decimal place without rounding.

Given:

TRUNCATE(15.79, 1)

Rule:

- Keep only 1 digit after decimal
- Do NOT round the number

Step-wise:

- Original number = 15.79
- Keep one decimal place → 15.7
- Next digit (9) is ignored (no rounding applied)

15.79 → 15.7
truncate 1 decimal

Final Answer: 15.7

Answer: (B)

Q6.

Solution

Concept: SQL string manipulation functions allow extraction of specific parts of a string. Functions like SUBSTR(), LEFT(), and RIGHT() are used to retrieve portions of text based on position and length. SUBSTR() is the most flexible among them, as it allows extraction from any position within the string, not just from the beginning or end.

Solution: The SUBSTR() function is used to extract a substring from a given string starting at a specified position and for a defined length. This makes it suitable for extracting characters from the middle of a string. LEFT() extracts characters from the beginning, RIGHT() from the end, and TRIM() removes spaces rather than extracting characters. Therefore, SUBSTR() is the correct function for this requirement.

Final Answer: SUBSTR()

Answer: (A)



Q7.

Solution

Concept: SQL provides mathematical functions to perform arithmetic operations like exponentiation.

Key Function:

- `POWER(x, y)` returns x^y

Explanation:

- `POWER(3, 4) = 34`
- $3 \times 3 \times 3 \times 3 = 81$
- Other options are invalid SQL functions for exponentiation

$$3 \xrightarrow{4} 81$$

POWER

Final Answer: `POWER(3,4)`

Answer: (B)

Q8.

Solution

Concept: The SQL `MONTH()` function is used to extract the month part from a given date.

Given:

`'2026-12-25'`

Explanation:

- Format of date: YYYY-MM-DD
- Month part = 12
- `MONTH()` returns numeric value, not name

$$2026-12-25 \longrightarrow \text{Month} = 12$$

`MONTH()`

Final Answer: `12`

Answer: (B)



Q9.

Solution

Concept: Relational Algebra is a formal query language used in database systems to perform operations on relations (tables). It includes operations like selection, projection, join, and cartesian product. Projection is specifically used to retrieve selected columns from a relation while eliminating duplicate rows, making it essential for column-wise data extraction.

Solution: In relational algebra, the Projection operation is denoted by π and is used to select a subset of columns from a table. Selection (σ) is used for filtering rows based on conditions, Cartesian Product (\times) combines all tuples from two relations, and Join (\bowtie) combines related tuples based on conditions. Therefore, Projection (π) is the correct operation for selecting columns.

Final Answer: Projection (π)

Answer: (B)

Q10.

Solution

Concept: In database design, keys are used to uniquely identify records in a table. A candidate key is a minimal set of attributes that can uniquely identify a row. When one candidate key is chosen as the primary key, the remaining candidate keys are still capable of uniquely identifying records and are called alternate keys.

Solution: An alternate key is a candidate key that is not selected as the primary key of the table. It still maintains uniqueness but is not used as the main identifier. A foreign key is used to create relationships between tables, a super key may contain extra attributes beyond minimal uniqueness, and a composite key consists of multiple attributes. Therefore, the correct answer is Alternate Key.

Final Answer: Alternate Key

Answer: (C)

Q11.

Solution

Concept: Database constraints are rules applied to table columns to ensure data integrity and consistency. The UNIQUE constraint ensures that all values in a column are distinct. However, unlike a primary key, it allows a single NULL value in most database systems. This makes it useful when uniqueness is required but null entries are also permitted.

Solution: The UNIQUE constraint ensures that no two rows have the same value in a column, while still allowing one NULL value depending on the database system. Primary Key also ensures uniqueness but does not allow NULL values. CHECK is used for validating conditions, and DEFAULT assigns default values. Therefore, UNIQUE is the correct constraint that satisfies the given condition.

Final Answer: Unique

Answer: (B)



Q12.

Solution

Concept: In the relational model, data is organized into tables where attributes represent columns and tuples represent rows. Two important terms used to describe a relation are degree and cardinality. Degree refers to the number of attributes in a relation, while cardinality refers to the number of tuples or rows present in the relation.

Solution: The number of attributes in a relation is called its degree, and the number of tuples is called its cardinality. This distinction is fundamental in database theory for describing the structure and size of a relation. Therefore, the correct pairing is Degree for attributes and Cardinality for tuples, making option (B) the correct answer.

Final Answer: Degree, Cardinality

Answer: (B)

Q13.

Solution

Concept: Network topology refers to the arrangement of nodes and connections in a computer network. Different topologies include star, bus, tree, and mesh. Mesh topology is considered the most reliable because every node is directly connected to every other node, providing multiple paths for data transmission and high fault tolerance.

Solution: In a mesh topology, each device is connected to every other device in the network. This ensures maximum reliability because if one connection fails, alternative paths are available for communication. Star topology connects nodes to a central hub, bus uses a single backbone, and tree is a hierarchical structure. Therefore, mesh topology is the most reliable among the given options.

Final Answer: Mesh

Answer: (B)



Q14.

Solution

Concept: In computer networking, MAC and IP addresses serve different purposes. A MAC address is a hardware-based identifier assigned to a network interface card and remains fixed, making it a physical address. An IP address is assigned logically by a network to identify a device on the internet or local network and can change over time, making it a logical address.

Solution: A MAC (Media Access Control) address is embedded in the hardware of a device and is used for local network communication at the data link layer. It is permanent and unique, hence it is called a physical address. On the other hand, an IP (Internet Protocol) address is assigned by a network administrator or DHCP server and can change depending on the network, making it a logical address used for routing data across networks. Therefore, MAC is Physical and IP is Logical.

Final Answer: Physical, Logical

Answer: (C)

Q15.

Solution

Concept: Networking devices are used to connect and manage communication between different systems. A gateway is a specialized device that connects two different networks, especially when they use different communication protocols. It performs protocol conversion and enables interoperability between heterogeneous networks.

Solution: Among the given options, a switch connects devices within the same network, a hub broadcasts data to all devices, and a repeater regenerates signals to extend network distance. However, a gateway is responsible for connecting two different networks that may use different protocols and architectures. It acts as an entry and exit point between networks and performs necessary translation. Therefore, the correct answer is Gateway.

Final Answer: Gateway

Answer: (C)



Q16.

Solution**Concept:** In postfix notation, operators come after operands and parentheses are not required.**Given Expression:**

$$(A + B) * (C - D)$$

Step-wise Conversion:

- Convert $(A + B) \rightarrow AB+$
- Convert $(C - D) \rightarrow CD-$
- Multiply both results $\rightarrow AB + CD - *$

Explanation:

- First resolve both brackets
- Then apply multiplication operator

Infix	→	Postfix
$(A + B)(C - D)$		$AB+CD-*$

Final Answer: $AB + CD - *$ **Answer:** (A)

Q17.

Solution

Concept: A stack follows the **LIFO (Last In First Out)** principle.

Given:

- Push order: $A \rightarrow B \rightarrow C$

Step-wise Behavior:

- A is pushed first
- B is pushed next
- C is pushed last (top of stack)
- Popping starts from top

Pop Order:

$C \rightarrow B \rightarrow A$
Push: A B C \longrightarrow Pop: C B A
LIFO

Final Answer:

Answer: (B)

Q18.

Solution

Concept: Data structures define how data is organized and accessed. FIFO (First-In-First-Out) is a principle where the first element inserted is the first one to be removed. This principle is implemented using a queue, which supports operations like enqueue (insert) and dequeue (delete).

Solution: A queue follows FIFO behavior, meaning elements are processed in the order they arrive. The first element inserted is the first one removed. A stack follows LIFO, a tree is a hierarchical structure, and a binary search tree organizes data in sorted order. Therefore, the correct data structure that follows FIFO is Queue.

Final Answer:

Answer: (B)



Q19.

Solution

Concept: In Python-like list implementations of queues, enqueue operations add elements to the rear of the queue. Efficiency depends on how operations affect shifting of elements. Appending to the end of a list is generally more efficient than inserting at the beginning or removing elements from arbitrary positions.

Solution: The most efficient enqueue operation in a list-based queue implementation is `list.append(val)`, because it adds the element at the end in constant time $O(1)$ in most cases. Operations like `insert(0, val)` are inefficient because they require shifting all elements. `pop()` removes elements, and `remove(val)` searches and deletes a specific element, both less efficient for enqueue. Therefore, `append` is correct.

Final Answer: `list.append(val)`

Answer: (B)

Q20.

Solution

Concept: In postfix evaluation, operators act on the most recent operands using a stack (LIFO order).

Given Expression:

$$5 \ 2 \ 3 \ * \ + \ 8 \ -$$

Step-wise Evaluation:

- First compute: $2 \times 3 = 6$
- Expression becomes: $5 + 6 - 8$
- Next: $5 + 6 = 11$
- Finally: $11 - 8 = 3$

Final Calculation:

$$5 + 2 \times 3 - 8 = 3$$

Stack Process \longrightarrow Result = 3

* then + then -

Final Answer: `3`

Answer: (B)



Q21.

Solution

Concept: In stack data structures, operations are performed using the Last-In-First-Out (LIFO) principle. Errors can occur during stack operations when improper conditions arise. Two common error conditions are overflow, when inserting into a full stack, and underflow, when removing elements from an empty stack. Proper handling of these conditions is essential for safe stack implementation.

Solution: When an attempt is made to remove (pop) an element from a stack that contains no elements, the condition is called stack underflow. Overflow occurs when trying to insert into a full stack. Garbage collection is a memory management process, and null pointer refers to an invalid memory reference. Therefore, the correct term for popping from an empty stack is underflow.

Final Answer: Underflow

Answer: (B)

Q22.

Solution

Concept: A stack is a linear data structure that follows the Last-In-First-Out (LIFO) principle. It requires a pointer or variable to keep track of the most recently inserted element, known as the top of the stack. All insertions (push) and deletions (pop) occur at this top position.

Solution: In stack implementation, the Top pointer is used to track the current topmost element. When a new element is added, the top pointer moves up, and when an element is removed, it moves down. Front and Rear are used in queues, while Head is used in linked lists. Therefore, the correct pointer for a stack is Top.

Final Answer: Top

Answer: (C)

Q23.

Solution

Concept: A circular queue is a linear data structure where the last position is connected back to the first position, forming a circle. It efficiently utilizes memory by reusing empty spaces. Special conditions are used to determine whether the queue is full or empty, often based on the relationship between front and rear pointers.

Solution: In a circular queue, when Front equals Rear, it may indicate either that the queue is empty or that it is full, depending on the implementation logic. Some implementations reserve an extra space to distinguish between full and empty conditions. Therefore, the correct answer is that both conditions are possible depending on implementation.

Final Answer: Both (Full or Empty) depending on implementation

Answer: (D)



Q24.

Solution

Concept: Infix to postfix conversion is an important concept in data structures and compiler design. Infix expressions use operators between operands, while postfix expressions place operators after operands. A stack is commonly used to manage operator precedence and parentheses during conversion.

Solution: The conversion of infix to postfix expression requires a stack data structure. The stack helps in storing operators temporarily and ensures correct precedence and associativity rules are followed. Queues, linked lists, and arrays are not suitable for handling operator precedence in this conversion process. Therefore, the correct answer is Stack.

Final Answer:

Answer: (B)

Q25.

Solution

Concept: A queue is a linear data structure that follows the First-In-First-Out (FIFO) principle. Elements are inserted at one end and removed from the other end. The two ends of a queue are known as front and rear, which control deletion and insertion operations respectively.

Solution: In a queue, insertion (enqueue) is performed at the rear end, while deletion (dequeue) is performed at the front end. This ensures FIFO behavior where the first inserted element is the first to be removed. Other combinations like top-bottom are used in stacks, not queues. Therefore, the correct answer is Rear, Front.

Final Answer:

Answer: (A)

Q26.

Solution

Concept: In Python, lists can be used to implement stack data structures. A stack follows the Last-In-First-Out (LIFO) principle. Python provides built-in methods to manipulate lists, including adding and removing elements efficiently from the end of the list, which simulates stack behavior.

Solution: The pop() method in Python removes and returns the last element of a list by default, making it suitable for stack implementation. The remove() method deletes a specific value, delete() is not a valid list method, and discard() is used in sets, not lists. Therefore, pop() is the correct method for stack-like behavior.

Final Answer:

Answer: (C)



Q27.

Solution

Concept: Sorting algorithms are used to arrange data in a specific order. Different algorithms use different strategies such as comparison, swapping, or insertion. Bubble Sort is one of the simplest algorithms where adjacent elements are repeatedly compared and swapped if they are in the wrong order.

Solution: Bubble Sort works by repeatedly comparing adjacent elements and swapping them if they are not in the correct order. This process continues until the entire list becomes sorted. Selection Sort selects the minimum element, Insertion Sort builds a sorted list gradually, and Quick Sort uses partitioning. Therefore, Bubble Sort is the correct answer.

Final Answer:

Answer: (C)

Q28.

Solution

Concept: Binary search is an efficient searching algorithm that works on sorted arrays. It repeatedly divides the search space into two halves and compares the target value with the middle element. For this method to work correctly, the data must be arranged in a specific order.

Solution: Binary search requires the list to be sorted so that comparisons can eliminate half of the search space at each step. If the list is unsorted, the algorithm cannot determine which half to discard. Therefore, the correct answer is that the list must be in sorted order.

Final Answer:

Answer: (B)



Q29.

Solution

Concept: Linear Search checks elements sequentially until the target is found.

Best Case Scenario:

- The element is found at the first position
- Only one comparison is required

Time Complexity:

- Best case = constant time
- Only one check is needed regardless of list size

Therefore:

$O(1)$
Target at first position → Found immediately
1 comparison

Final Answer:

Answer: (B)

Q30.

Solution

Concept: Selection sort is a comparison-based sorting algorithm that divides the list into a sorted and unsorted part. In each pass, it selects the smallest element from the unsorted portion and places it at the correct position in the sorted portion.

Solution: After the first pass of selection sort, the smallest element in the entire list is identified and placed at the first position. This position is now fixed and considered correct. Subsequent passes continue placing the next smallest elements in order. Therefore, after the first iteration, the smallest element is guaranteed to be in its correct sorted position.

Final Answer:

Answer: (B)



Q31.

Solution

Concept: Sorting algorithms arrange data in a specific order. Insertion sort builds the final sorted array one element at a time by inserting each new element into its correct position within the already sorted portion of the list.

Solution: Insertion sort works by taking one element at a time and inserting it into the correct position in an already sorted sub-list. This is similar to arranging playing cards in hand. Bubble sort swaps adjacent elements, selection sort selects minimum elements, and quick sort uses partitioning. Therefore, the correct answer is Insertion Sort.

Final Answer: Insertion Sort

Answer: (C)

Q32.

Solution

Concept: Binary Search repeatedly divides the search space into half, making it a logarithmic-time algorithm.

Formula:

$$\text{Maximum comparisons} \approx \lceil \log_2 n \rceil$$

:contentReference[oaicite:0]index=0

Calculation:

- $\log_2(10) \approx 3.32$
- Ceiling value = 4

Explanation:

- Each step halves the list:
- $10 \rightarrow 5 \rightarrow 3 \rightarrow 2 \rightarrow 1$ (maximum 4 steps)

$$10 \text{ elements} \longrightarrow 4 \text{ comparisons}$$

$$\log n$$

Final Answer: 4

Answer: (C)



Q33.

Solution

Concept: Sorting algorithms have different time complexities based on their approach. Algorithms like Bubble Sort, Selection Sort, and Insertion Sort typically involve nested loops, leading to quadratic time complexity in the worst case.

Solution: Bubble Sort, Selection Sort, and Insertion Sort all have a worst-case time complexity of $O(n^2)$ due to repeated comparisons and nested iterations. Bubble sort swaps adjacent elements repeatedly, selection sort scans for minimum elements, and insertion sort shifts elements for correct placement. Since all three share this worst-case behavior, the correct answer is All of the above.

Final Answer: All of the above

Answer: (D)

Q34.

Solution

Concept: In Linear Search, elements are checked one by one from the beginning until the target is found.

Worst Case Scenario:

- The element is at the last position of the list
- All elements must be checked

Step-wise Explanation:

- 1st comparison → element 1
- 2nd comparison → element 2
- ...
- N th comparison → last element found

Conclusion:

- Total comparisons = N

Start —————→ End (N th element)

N comparisons

Final Answer: N

Answer: (C)



Q35.

Solution

Concept: Searching algorithms are categorized based on their approach. Divide and Conquer is a strategy where a problem is repeatedly divided into smaller subproblems until they become simple to solve. Binary search is a classic example of this approach.

Solution: Binary search follows the divide and conquer strategy by repeatedly dividing the sorted list into two halves and eliminating one half based on comparison. Linear search, sequential search, and iterative search do not divide the problem into subparts. Therefore, the correct answer is Binary Search.

Final Answer: Binary Search

Answer: (B)

Q36.

Solution

Concept: In Python exception handling, different blocks are used to manage errors effectively. The try block contains risky code, except handles exceptions, else executes when no exception occurs, and finally always executes regardless of whether an exception occurs or not. This ensures proper cleanup operations such as closing files or releasing resources.

Solution: The finally block in Python is specifically designed to execute code irrespective of whether an exception occurs in the try block or not. It is commonly used for cleanup activities like closing files, releasing resources, or ending connections. The except block handles errors, else runs only when no exception occurs, and catch is not used in Python (it belongs to other languages like Java). Therefore, the correct answer is finally.

Final Answer: finally

Answer: (C)

Q37.

Solution

Concept: File handling in Python provides functions to read and write data efficiently. When dealing with multiple strings at once, Python offers specific methods to handle sequences of strings. These methods differ in how they process single strings, lists, or binary data. Understanding these functions is important for effective file operations and data storage.

Solution: The writelines() function in Python is used to write a list of strings into a file at once. It takes an iterable such as a list and writes each string sequentially into the file without adding automatic newline characters unless explicitly included. The write() function is used for writing a single string, dump() is used in the pickle module for serializing objects into binary files, and put() is not a valid Python file handling function. Therefore, writelines() is the correct answer.

Final Answer: writelines()

Answer: (B)



Q40.

Solution

Concept: In Python file handling, exceptions are used to manage runtime errors. When attempting to open a file that does not exist in read mode, Python raises a specific exception to indicate that the file cannot be found.

Solution: When a file is opened in read mode and it does not exist, Python raises a FileNotFoundError. This exception is more specific than IOError in modern Python versions. NameError and ValueError are unrelated to file existence issues. Therefore, the correct exception is FileNotFoundError.

Final Answer: FileNotFoundError

Answer: (B)

Q41.

Solution

Concept: In Python file handling, the file pointer indicates the current position within a file. Various methods are used to control or query this pointer. The seek() method is specifically designed to move the file pointer to a desired position.

Solution: The seek() method is used to change the position of the file pointer within a file. It allows random access to file data by moving the pointer to a specific byte location. It does not search for strings, close files, or directly return the current position. Therefore, the correct answer is that it moves the file pointer to a specific position.

Final Answer: Move file pointer to a specific position

Answer: (B)

Q42.

Solution

Concept: Python provides multiple methods to read data from files. These methods differ based on whether they read the entire file, a single line, or multiple lines. File data can be returned as strings or lists depending on the method used.

Solution: The readlines() function reads all remaining lines from a file and returns them as a list, where each line is an element in the list. The read() function reads the entire file as a single string, readline() reads one line at a time, and load() is not a standard file reading function. Therefore, readlines() is the correct answer.

Final Answer: readlines()

Answer: (C)



Q43.

Solution

Concept: File handling modes in Python determine how a file is accessed and manipulated. Different modes such as read, write, append, and binary modes control whether data is read, overwritten, or added. The append mode is particularly used when existing data must be preserved while new data is added.

Solution: The 'a' mode in Python file handling stands for append mode. When a file is opened in this mode, new data is added at the end of the file without deleting or modifying the existing content. If the file does not exist, it is automatically created. Unlike 'w' mode, which overwrites the file, 'a' ensures that previous data remains intact while allowing continuous addition of new information. Therefore, the correct answer is that it adds new data to the end of the file.

Final Answer: Adds new data to the end of the file

Answer: (C)

Q44.

Solution

Concept: Email communication over networks relies on specific application-layer protocols. These protocols define how messages are sent, received, and stored. Different protocols such as SMTP, POP3, IMAP, HTTP, and FTP serve different purposes in network communication systems.

Solution: SMTP (Simple Mail Transfer Protocol) is the standard protocol used for sending emails over the internet. It is responsible for transferring outgoing mail from a client to a mail server or between servers. POP3 is used for receiving emails, HTTP is used for web browsing, and FTP is used for file transfer. Therefore, SMTP is the correct protocol for sending emails.

Final Answer: SMTP

Answer: (C)

Q45.

Solution

Concept: Malware refers to malicious software designed to harm or exploit computer systems. Different types of malware behave differently. Some attach to programs, while others are independent and spread through networks by replicating themselves without user intervention.

Solution: A worm is a type of malware that can self-replicate and spread independently across networks without needing to attach itself to a host program. A virus requires a host file, a Trojan disguises itself as legitimate software, and spyware collects user data secretly. Therefore, the correct answer is Worm.

Final Answer: Worm

Answer: (B)



Q46.

Solution

Concept: Data transmission techniques in computer networks determine how data is sent from source to destination. Different switching techniques include circuit switching, message switching, and packet switching, each with unique methods of handling data flow.

Solution: Packet switching divides data into small packets, which are sent independently over the network and reassembled at the destination. This improves efficiency and reliability. Circuit switching establishes a dedicated path, message switching sends entire messages, and frequency switching is not a standard networking method. Therefore, packet switching is the correct answer.

Final Answer: Packet Switching

Answer: (C)

Q47.

Solution

Concept: Data communication networks use different switching techniques to transmit information between sender and receiver. These techniques determine how data is routed and delivered. In some methods, data is sent as a continuous stream, while in others it is divided into packets or messages. Circuit switching is a technique where a dedicated communication path is established before data transfer begins, ensuring a continuous and stable connection during transmission.

Solution: In circuit switching, a dedicated physical or logical path is established between the sender and the receiver before actual communication starts. This path remains reserved exclusively for the entire duration of the communication session, ensuring that all data follows the same route without interruption. This method is commonly used in traditional telephone networks where a fixed connection is maintained during a call. Packet switching, on the other hand, breaks data into packets that travel independently through different routes and are reassembled at the destination. Message switching stores the entire message at intermediate nodes before forwarding it, which can cause delays. Virtual circuit switching is a hybrid approach where a logical path is established, but resources may not be fully reserved like in circuit switching. Therefore, the correct answer is circuit switching because it provides a dedicated end-to-end communication path before data transfer begins, ensuring consistent transmission quality throughout the session.

Final Answer: Circuit Switching

Answer: (C)



Q48.

Solution

Concept: Malware refers to malicious software designed to damage, disrupt, or gain unauthorized access to computer systems. Different types of malware behave differently. Some disguise themselves as legitimate software to trick users, while others directly encrypt data or display unwanted advertisements. Understanding malware types is important for cybersecurity awareness and safe computing practices.

Solution: A Trojan Horse is a type of malware that appears to be useful or legitimate software but performs malicious actions in the background once installed. It does not replicate itself like a virus or worm but relies on user deception. Adware mainly displays unwanted advertisements, ransomware encrypts files and demands payment, and cookies are not malware but small data files used by websites. Therefore, the correct answer is Trojan Horse.

Final Answer: Trojan Horse

Answer: (B)

Q49.

Solution

Concept: Data security is an essential part of computer networks and information systems. Sensitive data is protected using cryptographic techniques. These techniques convert readable data into an unreadable form so that unauthorized users cannot access or understand it without proper authorization.

Solution: Encryption is the process of converting plain text into an unreadable format called ciphertext to ensure data security. Only authorized users with a decryption key can convert it back into readable form. Decryption is the reverse process of encryption, firewalling protects networks from unauthorized access, and routing is used to forward data packets in a network. Therefore, the correct answer is Encryption.

Final Answer: Encryption

Answer: (B)



Q50.

Solution

Concept: Network protocols define rules for communication between devices over a network. Different protocols serve different purposes such as file transfer, remote login, email communication, and network management. FTP is specifically designed for transferring files between systems efficiently and reliably.

Solution: FTP (File Transfer Protocol) is used for transferring files between a client and a server over a network. It allows users to upload, download, and manage files remotely. Telnet is used for remote login, TCP/IP is a suite of communication protocols for networking, and SNMP is used for network management. Therefore, FTP is the correct answer for file transfer.

Final Answer:

Answer: (C)



Answer Key

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

