CUET-UG Computer Science Sample Paper-19

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. What will be the output of the SQL command: `SELECT INSTR('INFORMATICS', 'MA');`

(A) 5

(B) 6

(C) 4

(D) 0

Q2. Which SQL function is used to return the name of the month for a specific date expression?

(A) MONTH()

(B) MONTHNAME()

(C) GETMONTH()

(D) CALENDAR_MONTH()

Q3. What is the result of the following query: `SELECT ROUND(156.789, -1);`

(A) 156.8

(B) 157

(C) 160

(D) 150

Q4. Which function would you use to remove trailing spaces from a string value?

(A) LTRIM()

(B) TRIM()

(C) RTRIM()

(D) STRIP()

Q5. The SQL function `MID('COMPUTER', 3, 4)` will return:

(A) OMPU

(B) MPUT

(C) OMPUT

(D) PUT

Q6. Which of the following is NOT a valid mathematical function in MySQL?

(A) MOD()

(B) POWER()

(C) SQRT()

(D) AVERAGE()

Q7. To display the current date only (without time), which function is most appropriate?

(A) NOW()

(B) CURDATE()

(C) SYSDATE()

(D) TODAY()

Q8. What is the output of `SELECT LCASE(LEFT('CUET2026', 4));`

(A) cuet

(B) 2026

(C) CUET

(D) cuet2026

Q9. In Relational Algebra, which operator is represented by the Greek letter Pi (π)?

(A) Selection

(B) Join

(C) Projection

(D) Union

Q10. A candidate key that is not selected to be the primary key of a table is called an:

(A) Alternate Key

(B) Foreign Key

(C) Composite Key

(D) Primary Key

Q11. Which integrity constraint ensures that a value in a column must exist in a related table's primary key?

(A) Entity Integrity

(B) Domain Integrity

(C) Referential Integrity

(D) Unique Constraint

Q12. The operation that produces a relation consisting of all combinations of tuples from two relations is:

(A) Natural Join

(B) Cartesian Product

(C) Set Difference

(D) Intersection

Q13. Which network topology involves a central hub or switch to which all other nodes are connected?

(A) Bus

(B) Ring

(C) Star

(D) Mesh

Q14. A MAC address is a 48-bit address usually represented in which format?

(A) Decimal

(B) Binary

(C) Hexadecimal

(D) Octal

Q15. Which networking device operates at the Data Link Layer and filters traffic based on MAC addresses?

(A) Repeater

(B) Switch

(C) Hub

(D) Router

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

(A) ABC*D/+

(B) ABC*+D/

(C) ABCD+*/

(D) AB+C*D/

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

(A) Queue

(B) List

(C) Stack

(D) Binary Tree

Q18. What is the result of evaluating the postfix expression: `10 2 3 * + 4 -`?

(A) 12

(B) 16

(C) 8

(D) 10

Q19. In a queue implemented using a Python list, the `pop(0)` operation corresponds to:

(A) Enqueue

(B) Dequeue

(C) Peek

(D) Overflow

Q20. The conversion of an infix expression to a postfix expression typically requires which data structure?

(A) Queue

(B) Tree

(C) Stack

(D) Linked List

Q21. A queue is a ____ data structure where insertion happens at the ____ end.

(A) LIFO, Front

(B) FIFO, Rear

(C) LIFO, Rear

(D) FIFO, Front

Q22. When an element is added to a full stack, the condition is known as:

(A) Underflow

(B) Collision

(C) Overflow

(D) Garbage

Q23. In Python, which list method is used to implement the 'Push' operation of a stack?

(A) push()

(B) add()

(C) append()

(D) insert(0)

Q24. What is the prefix form of the expression: `A - B / C`?

(A) -A/BC

(B) AB-C/

(C) /-ABC

(D) ABC/-

Q25. Which of the following is an application of a Stack?

(A) Printer spooling

(B) Undo mechanism in text editors

(C) CPU Scheduling

(D) Breadth-First Search

Q26. In a circular queue of size N, the next position for the rear pointer is calculated as:

(A) $(Rear + 1)$

(B) $(Rear + 1)/N$

(C) $(Rear + 1)\%N$

(D) $Rear + N$

Q27. Which sorting algorithm repeatedly picks the smallest element from the unsorted part and puts it at the beginning?

(A) Bubble Sort

(B) Insertion Sort

(C) Selection Sort

(D) Binary Sort

Q28. In Binary Search, what is the maximum number of comparisons for a list of size 16?

(A) 16

(B) 8

(C) 4

(D) 5

Q29. Which sorting algorithm works by comparing and swapping adjacent elements?

(A) Insertion Sort

(B) Bubble Sort

(C) Selection Sort

(D) Quick Sort

Q30. What is the time complexity of a Linear Search in the worst case?

(A) $O(1)$

(B) $O(\log n)$

(C) $O(n)$

(D) $O(n^2)$

Q31. Which sort is generally efficient for small datasets or lists that are already partially sorted?

(A) Bubble Sort

(B) Selection Sort

(C) Insertion Sort

(D) Merge Sort

Q32. In Selection Sort, if the list has 5 elements, how many passes are required?

(A) 5

(B) 4

(C) 10

(D) 25

Q33. Binary Search requires the array to be in which state?

(A) Unsorted

(B) Sorted

(C) Circular

(D) Doubly linked

Q34. Which sorting technique maintains a "sorted sub-list" and "unsorted sub-list"?

(A) Linear Search

(B) Insertion Sort

(C) Bubble Sort

(D) Selection Sort

Q35. If the middle element is less than the target value in a Binary Search (ascending list), the search continues in:

(A) The left half

(B) The right half

(C) The whole list

(D) The search stops

Q36. Which block in Python is used to write code that may potentially raise an exception?

(A) catch

(B) except

(C) try

(D) error

Q37. What is the purpose of the `finally` block in exception handling?

(A) To execute code only if an error occurs

(B) To execute code only if no error occurs

(C) To execute code regardless of whether an error occurred

(D) To terminate the program

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

(A) write()

(B) writelines()

(C) putlines()

(D) listwrite()

Q39. In file handling, the `seek(0, 2)` command moves the file pointer to:

(A) The beginning of the file

(B) The end of the file

(C) The next line

(D) The current position

Q40. Which Python module is primarily used for serializing and de-serializing (pickling) data in binary files?

(A) os

(B) sys

(C) pickle

(D) binary

Q41. What does the 'a' mode signify when opening a file?

(A) Access

(B) Append

(C) Abort

(D) Add

Q42. Which exception is raised when you try to divide a number by zero?

(A) ValueError

(B) ArithmeticError

(C) ZeroDivisionError

(D) DivideByZero

Q43. The `read(n)` function in file handling reads:

(A) n lines

(B) n characters (or bytes)

(C) n words

(D) Up to the n-th line

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

(A) HTTP

(B) FTP

(C) SMTP

(D) SCP/SFTP

Q45. Which protocol is responsible for the secure transfer of data between a web browser and a web server by encrypting the communication using SSL/TLS?

(A) HTTP

(B) FTP

(C) HTTPS

(D) SMTP

Q46. Which type of switching breaks data into small blocks and sends them independently over the network?

(A) Circuit Switching

(B) Packet Switching

(C) Line Switching

(D) Message Switching

Q47. A self-replicating program that spreads over a network without human intervention is called a:

(A) Virus

(B) Trojan Horse

(C) Worm

(D) Spyware

Q48. Which security threat involves tricking users into revealing sensitive information via fake emails?

(A) Phishing

(B) Denial of Service

(C) Sniffing

(D) Spooling

Q49. Which protocol is used by web browsers to fetch web pages securely?

(A) TCP/IP

(B) HTTPS

(C) FTP

(D) DNS

Q50. In circuit switching, a dedicated physical path is established between sender and receiver. (True/False)

(A) True

(B) False

(C) Partially True

(D) None of these

Detailed Solutions

Q1.

Solution

Concept: The SQL function `INSTR()` returns the position (starting index) of the first occurrence of a substring within a given string. Indexing in SQL starts from 1. If the substring is not found, it returns 0. It scans the string from left to right and matches characters sequentially to identify the starting position of the substring.

Visual Representation (Index Mapping):

```
String:  I  N  F  O  R  M  A  T  I  C  S
Index :  1  2  3  4  5  6  7  8  9 10 11
                  M  A
                  6  7
```

Solution: We are given the string `INFORMATICS` and the substring `MA`. We locate the sequence "M" followed by "A" in the string.

- 'M' is at position 6 - 'A' is at position 7 - Therefore, the substring "MA" starts at position 6

Since `INSTR()` returns the starting index of the substring, the output is 6.

Final Answer: 6

Answer: (B)

Q2.

Solution

Concept: SQL provides various date and time functions to extract specific components from date values. One such function is used to retrieve the full name of the month from a given date expression. These functions are widely used in reporting and data analysis to make date values more readable. Instead of numeric representations, textual representations like month names improve clarity in outputs. MySQL supports multiple date functions such as MONTH(), YEAR(), and MONTHNAME(), each serving different extraction purposes. Understanding these functions helps in formatting and presenting date-related information effectively in database queries.

Solution: The question asks for the function that returns the name of the month from a date expression. Among the given options, `MONTHNAME()` is specifically designed to return the full textual name of the month such as "January", "February", etc. The function `MONTH()` only returns the numeric month value (1–12), not the name. The options `GETMONTH()` and `CALENDAR_MONTH()` are not standard MySQL functions. Therefore, the correct function that fulfills the requirement of returning the month name is `MONTHNAME()`.

Final Answer: MONTHNAME()

Answer: (B)

Q3.

Solution

Concept: In SQL, the `ROUND()` function can round numbers to positions left of the decimal point when a negative precision is used.

Given:

$$\texttt{ROUND}(156.789,\ -1)$$

Step-wise Explanation:

- Negative precision -1 means rounding to the nearest tens place
- Number = 156.789
- Ones digit = 6, which is ≥ 5, so round up
- 156 rounds to 160

$$156.789 \xrightarrow[\text{round -1}]{} 160$$

Final Answer: 160

Answer: (C)

Q4.

Solution

Concept: SQL string functions provide tools to manipulate and clean text data. One common requirement is removing unwanted spaces from strings. Leading spaces are removed using `LTRIM()`, trailing spaces using `RTRIM()`, and both leading and trailing spaces using `TRIM()`. These functions are important in data preprocessing, especially when working with user input or imported datasets. Clean string values ensure accurate comparisons, searches, and joins in SQL operations. Different database systems may support slightly different syntax, but these functions are standard in MySQL.

Solution: The question asks for the function that removes trailing spaces from a string. Trailing spaces are spaces present at the end of a string value. Among the given options, `RTRIM()` specifically removes only trailing spaces while preserving leading spaces. `LTRIM()` removes leading spaces, and `TRIM()` removes both leading and trailing spaces. `STRIP()` is not a valid MySQL function. Therefore, the correct function for removing trailing spaces is `RTRIM()`.

Final Answer: RTRIM()

Answer: (C)

Q5.

Solution

Concept: The SQL `MID()` function extracts a substring from a string starting at a given position for a specified length.

Given:

`MID('COMPUTER', 3, 4)`

Step-wise Breakdown:

- String: C O M P U T E R
- Start position = 3 → letter = M
- Length = 4 characters
- Extract: M P U T

Result:

MPUT

COMPUTER ⟶ MPUT

MID(3,4)

Final Answer: MPUT

Answer: (B)

Q6.

Solution

Concept: SQL provides a wide range of mathematical functions such as `MOD()`, `POWER()`, `SQRT()`, and aggregation functions like `AVG()`. These functions are used for performing calculations on numeric data. Mathematical functions are essential in statistical analysis, financial computations, and data processing. It is important to distinguish between scalar mathematical functions and aggregate functions. Some functions compute row-wise operations, while others summarize entire datasets. Understanding valid function names in a specific SQL dialect like MySQL is crucial for writing correct queries.

Solution: The question asks which option is NOT a valid mathematical function in MySQL. The functions `MOD()`, `POWER()`, and `SQRT()` are valid mathematical functions used for modulus, exponentiation, and square root operations respectively. However, `AVERAGE()` is not a valid MySQL function. Instead, MySQL uses `AVG()` to calculate the average of a set of values. Therefore, `AVERAGE()` is incorrect and does not exist as a built-in function in MySQL. Hence, the correct answer is `AVERAGE()`.

Final Answer: AVERAGE()

Answer: (D)

Q7.

Solution

Concept: SQL provides several date and time functions to retrieve system date values. Some functions return both date and time, while others return only the date portion. Choosing the correct function depends on whether time information is required. Functions like NOW() and SYSDATE() return full timestamp values, including date and time. CURDATE() specifically returns only the current date without time. Some systems may use aliases like TODAY(), but it is not standard in MySQL. Understanding these differences is important for accurate date handling in queries and reports.

Solution: The question asks for the function that returns only the current date without time. Among the options, NOW() returns both current date and time, and SYSDATE() also returns the current timestamp including time. CURDATE() is the correct MySQL function that returns only the current date in the format YYYY-MM-DD without any time component. The function TODAY() is not a valid MySQL function. Therefore, to display only the current date, CURDATE() is the most appropriate choice. It is commonly used in database queries where time precision is not required.

Final Answer: CURDATE()

Answer: (B)

Q8.

Solution

Concept: SQL functions can be nested. Here, `LEFT()` extracts a substring and `LCASE()` converts it to lowercase.

Given Expression:

```
SELECT LCASE(LEFT('CUET2026', 4));
```

Step-wise Evaluation:

- Step 1: `LEFT('CUET2026', 4)` → CUET
- Step 2: `LCASE('CUET')` → cuet

Final Output:

cuet

CUET2026 ⟶ cuet

LEFT + LCASE

Final Answer: cuet

Answer: (A)

Q9.

Solution

Concept: In Relational Algebra, different symbols are used to represent operations on relations (tables). The Greek letter Pi (π) is used to represent the Projection operation. Projection is used to select specific columns from a relation while eliminating duplicate rows. Other operators include Sigma (σ) for selection, which filters rows, and various join operations for combining relations. Understanding relational algebra is fundamental for database theory and forms the basis of SQL query processing and optimization.

Solution: The question asks which operation is represented by the symbol π. In relational algebra, π stands for Projection. Projection is used to extract specific attributes (columns) from a relation while discarding the rest. Selection (σ) filters rows based on conditions, Join combines tables based on related attributes, and Union merges tuples from two relations. Since π specifically represents column selection, the correct answer is Projection.

Final Answer: Projection

Answer: (C)

Q10.

Solution

Concept: In database design, keys are used to uniquely identify records in a table. A candidate key is a set of attributes that can uniquely identify a tuple. Among multiple candidate keys, one is chosen as the primary key. The remaining candidate keys that are not selected as primary keys are called alternate keys. These keys still maintain uniqueness but are not used as the main identifier. Understanding key types is essential for ensuring proper database normalization and integrity.

Solution: The question asks what a candidate key is called when it is not selected as the primary key. In a table, multiple candidate keys may exist, but only one is chosen as the primary key. The remaining candidate keys that are not selected are referred to as alternate keys. Foreign keys are used to establish relationships between tables, composite keys involve multiple attributes, and primary keys are the main unique identifiers. Therefore, the correct term for an unused candidate key is Alternate Key.

Final Answer: Alternate Key

Answer: (A)

Q11.

Solution

Concept: Integrity constraints in relational databases ensure the accuracy and consistency of data. Referential integrity is one of the most important constraints, ensuring that relationships between tables remain valid. It enforces that a foreign key in one table must match a primary key in another table or be null if allowed. Other constraints include entity integrity, which ensures primary keys are unique and not null, and domain integrity, which restricts valid data types and values for attributes.

Solution: The question asks which constraint ensures that a value in one column must exist in another table's primary key. This directly refers to referential integrity, which maintains consistency between related tables. It ensures that foreign key values correspond to existing primary key values in the referenced table. Entity integrity ensures uniqueness of primary keys, domain integrity restricts valid data types, and unique constraint ensures no duplicate values. Since the requirement is about maintaining relationships between tables, referential integrity is correct.

Final Answer: Referential Integrity

Answer: (C)

Q12.

Solution

Concept: In relational algebra, operations are used to manipulate and combine relations (tables). The Cartesian Product is one of the fundamental operations that combines every tuple of one relation with every tuple of another relation. It produces all possible combinations of rows, which can later be filtered using join or selection operations. While powerful, it often generates large result sets and is rarely used directly in practical queries without conditions.

Solution: The question asks which operation produces all possible combinations of tuples from two relations. The Cartesian Product satisfies this definition, as it pairs every row of the first relation with every row of the second relation. Natural Join combines related rows based on matching attributes, Set Difference returns tuples present in one relation but not the other, and Intersection returns common tuples. Since the requirement is all combinations without conditions, the correct answer is Cartesian Product.

Final Answer: Cartesian Product

Answer: (B)

Q13.

Solution

Concept: Network topologies define how computers and devices are arranged in a network. Common types include bus, ring, star, and mesh topologies. In a star topology, all devices are connected to a central hub or switch, which manages communication between nodes. This structure improves scalability and fault isolation. If one node fails, it does not affect the entire network. Star topology is widely used in modern LANs due to its simplicity and reliability.

Solution: The question asks which topology uses a central hub or switch connecting all nodes. In a star topology, every device is directly connected to a central device such as a switch or hub. Bus topology connects all devices in a single line, ring topology connects devices in a circular fashion, and mesh topology connects each device to multiple others. Since only star topology uses a central hub for all connections, it is the correct answer.

Final Answer: Star

Answer: (C)

Q14.

Solution

Concept: A MAC (Media Access Control) address is a unique hardware address assigned to network interface cards. It is a 48-bit identifier used for device identification at the data link layer. Since binary representation is too long and decimal or octal are not commonly used for hardware addressing, MAC addresses are typically written in hexadecimal format. Hexadecimal makes the 48-bit binary value compact and easier to read, usually represented in pairs separated by colons or hyphens.

Solution: A MAC address consists of 48 bits, which is equivalent to 12 hexadecimal digits. Each hexadecimal digit represents 4 bits, making it efficient to represent binary data. For example, a MAC address like 00:1A:2B:3C:4D:5E is in hexadecimal format. Decimal and octal formats are not used because they do not map efficiently to binary hardware representation. Binary format would be too long and difficult to interpret. Therefore, the standard and most appropriate representation of a MAC address is hexadecimal.

Final Answer: Hexadecimal

Answer: (C)

Q15.

Solution

Concept: In computer networks, devices operate at different layers of the OSI model. The Data Link Layer is responsible for node-to-node communication and uses MAC addresses for identification. A switch operates at this layer and intelligently forwards data frames only to the intended recipient based on MAC address tables. Unlike hubs, which broadcast data to all devices, switches improve network efficiency by filtering traffic. Routers operate at the network layer, while repeaters work at the physical layer.

Solution: The question asks which device works at the Data Link Layer and filters traffic using MAC addresses. A switch is the correct answer because it maintains a MAC address table and forwards frames only to the correct destination port. A hub simply broadcasts data to all connected devices without filtering. A repeater regenerates signals at the physical layer, and a router works at the network layer using IP addresses. Therefore, the device that performs MAC-based filtering is a switch.

Final Answer: Switch

Answer: (B)

Q16.

Solution

Concept: In postfix conversion, operators are placed after their operands and precedence is strictly followed.

Given Expression:

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

Step-wise Conversion:

- Step 1: $B * C \rightarrow BC*$
- Step 2: $(BC*)/D \rightarrow BC * D/$
- Step 3: $A + (BC * D/) \rightarrow ABC * D/+$

Final Postfix Expression:

$$ABC * D/+$$

A + (B*C)/D $\longrightarrow$ ABC*D/+

conversion

Final Answer: ABC*D/+

Answer: (A)

Q17.

Solution

Concept: A stack is a linear data structure that follows the LIFO (Last-In-First-Out) principle. This means the last element inserted is the first one to be removed. Common operations include push (insert) and pop (remove). Stacks are used in recursion, expression evaluation, undo operations, and function call management. Other data structures like queues follow FIFO, where the first element inserted is removed first. Understanding stack behavior is essential in algorithm design and memory management.

Solution: The question asks which data structure follows the LIFO principle. In a stack, elements are added and removed from the same end called the top. The last element pushed onto the stack is the first one to be popped, making it a LIFO structure. A queue follows FIFO, a list is a general structure without strict ordering rules, and a binary tree is a hierarchical structure. Therefore, the correct answer is Stack.

Final Answer: Stack

Answer: (C)

Q18.

Solution

Concept: Postfix expressions are evaluated using a stack, where operators act on the most recent operands.

Given Expression:

$$10\ 2\ 3\ *\ +\ 4\ -$$

Step-wise Evaluation:

- Step 1: $2 \times 3 = 6$
- Step 2: $10 + 6 = 16$
- Step 3: $16 - 4 = 12$

Final Result:

$$12$$

$$\text{Stack evaluation} \longrightarrow 12$$

$$\text{* then + then -}$$

Final Answer: 12

Answer: (A)

Q19.

Solution

Concept: In Python, a queue follows the FIFO (First-In-First-Out) principle. While Python lists are not optimal for queue implementation, operations like `pop(0)` remove the first element from the list. This simulates dequeue operation in a queue. Enqueue adds elements at the rear, while dequeue removes from the front. Efficient queue implementations usually use collections like deque for better performance.

Solution: The operation `pop(0)` removes the element at index 0, which is the front of the list. In queue terminology, removing the front element is called dequeue. Therefore, `pop(0)` corresponds to the dequeue operation in a queue implemented using a Python list. It is not enqueue, peek, or overflow. Hence, the correct answer is Dequeue.

Final Answer: Dequeue

Answer: (B)

Q20.

Solution

Concept: Expression conversion from infix to postfix notation is a fundamental topic in data structures and compiler design. Infix expressions contain operators between operands and require precedence rules and parentheses. To simplify evaluation, they are converted into postfix form where operators follow operands. A stack is used to temporarily store operators and manage precedence. The Last-In-First-Out behavior of stacks makes them ideal for handling nested operations and ensuring correct order during conversion.

Solution: The conversion of infix to postfix expression requires a stack data structure. During conversion, operands are directly added to the output, while operators are pushed onto a stack based on precedence rules. When higher precedence operators appear, lower precedence operators are popped from the stack. This process continues until the entire expression is processed. Queue, tree, and linked list are not suitable because they do not support LIFO-based operator management. Therefore, the correct answer is Stack.

Final Answer: Stack

Answer: (C)

Q21.

Solution

Concept: A queue is a linear data structure that follows the FIFO (First-In-First-Out) principle. In this structure, elements are inserted at the rear end and removed from the front end. This behavior is similar to real-life queues such as people waiting in a line. Understanding queue operations is important for scheduling, buffering, and process management in operating systems and computer networks.

Solution: The question describes the nature of a queue and the position where insertion happens. In a queue, insertion always occurs at the rear end, and deletion happens at the front end. This ensures that the first element inserted is the first one to be removed, following FIFO order. Therefore, the correct combination is FIFO, Rear. Other options like LIFO describe stack behavior, not queue behavior. Hence, the correct answer is FIFO, Rear.

Final Answer: FIFO, Rear

Answer: (B)

Q22.

Solution

Concept: In stack data structures, operations like push and pop are fundamental. A stack has a limited size, and when it becomes full, no more elements can be inserted. Attempting to insert an element into a full stack leads to a special condition called overflow. This is an important concept in memory management and data structure implementation. Underflow occurs when removing from an empty stack, while overflow occurs when adding beyond capacity.

Solution: The question asks about the condition when an element is added to a full stack. Since a stack has fixed capacity, inserting beyond its limit causes overflow. Underflow refers to removing elements from an empty stack, collision is related to hashing, and garbage is unrelated to stack operations. Therefore, the correct term for inserting into a full stack is Overflow.

Final Answer: Overflow

Answer: (C)

Q23.

Solution

Concept: In Python, stacks can be implemented using lists. A stack follows the LIFO (Last-In-First-Out) principle, where elements are added and removed from the same end. The push operation inserts an element at the top of the stack. Python provides the `append()` method to add elements to the end of a list, making it suitable for implementing stack push operations.

Solution: The question asks which method implements the push operation in a Python stack. The correct method is `append()`, which adds an element to the end of the list, acting as the top of the stack. The `push()` method does not exist in Python lists, `add()` is used in sets, and `insert(0)` inserts at the beginning, which is inefficient for stack implementation. Therefore, the correct answer is append().

Final Answer: append()

Answer: (C)

Q24.

Solution

Concept: In prefix notation, operators are written before operands, and operator precedence is followed.

Given Expression:

$$A - B/C$$

Step-wise Conversion:

- Step 1: $B/C \rightarrow /BC$
- Step 2: $A - (/BC) \rightarrow -A/BC$

Final Prefix Form:

$$-A/BC$$

A - B/C $\longrightarrow$ -A/BC

prefix conversion

Final Answer: -A/BC

Answer: (A)

Q25.

Solution

Concept: A stack is a linear data structure that follows the LIFO principle and is used in many real-world applications. It is especially useful in situations where the most recent action needs to be reversed or accessed first. Common applications include function calls, expression evaluation, and undo operations. Understanding stack applications helps in identifying appropriate use cases in programming and system design.

Solution: The question asks for an application of a stack. The undo mechanism in text editors uses a stack to store previous actions so they can be reversed in reverse order. Printer spooling uses a queue, CPU scheduling uses queue-based algorithms, and Breadth-First Search uses a queue as well. Therefore, the correct application of a stack is the undo mechanism in text editors.

Final Answer: Undo mechanism in text editors

Answer: (B)

Q26.

Solution

Concept: A circular queue uses modulo arithmetic to reuse freed positions when the rear reaches the end of the array.

Key Idea:

- The next position wraps around using modulus operator

Explanation:

- $(Rear + 1)$ alone may go out of bounds
- Division is not used for indexing
- Modulus ensures circular behavior within range 0 to $N - 1$

$$\text{Rear} \longrightarrow \text{Rear + 1 mod N}$$

wrap around

Final Answer: (Rear + 1) % N

Answer: (C)

Q27.

Solution

Concept: Sorting algorithms are used to arrange data in a specific order, usually ascending or descending. Selection sort works by repeatedly finding the smallest element from the unsorted portion of the list and placing it at the beginning. This process reduces the unsorted portion step by step. It is simple but inefficient for large datasets due to its quadratic time complexity.

Solution: The question asks which algorithm repeatedly selects the smallest element and places it at the beginning. In selection sort, the smallest element is found in each pass and swapped with the first unsorted element. Bubble sort compares adjacent elements, insertion sort builds a sorted list incrementally, and binary sort is not a standard algorithm. Therefore, the correct answer is Selection Sort.

Final Answer: Selection Sort

Answer: (C)

Q28.

Solution

Concept: Binary Search works by repeatedly dividing the search space into two halves.

Formula:

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

Step-wise Calculation:

- $16 = 2^4$
- $\log_2(16) = 4$
- Hence, maximum comparisons = 4

Explanation:

- Each step halves the array: $16 \to 8 \to 4 \to 2 \to 1$
- Total steps = 4

$$16 \text{ elements} \xrightarrow[\log 16]{} 4 \text{ comparisons}$$

Final Answer: 4

Answer: (C)

Q29.

Solution

Concept: Sorting algorithms arrange data in order and differ in their approach. Bubble sort repeatedly compares adjacent elements and swaps them if they are in the wrong order. This process continues until the list is sorted. It is simple but inefficient for large datasets. Other algorithms like insertion sort, selection sort, and quick sort use different strategies for sorting.

Solution: The question asks which sorting algorithm compares and swaps adjacent elements. Bubble sort performs exactly this operation by repeatedly checking neighboring elements and swapping them if needed. Insertion sort builds a sorted portion, selection sort selects minimum elements, and quick sort uses partitioning. Therefore, the correct answer is Bubble Sort.

Final Answer: Bubble Sort

Answer: (B)

Q30.

Solution

Concept: Linear Search checks each element sequentially until the target is found or the list ends.

Worst Case Scenario:

- The element is either at the last position or not present in the list
- All n elements must be checked

Explanation:

- Best case: $O(1)$ (first element)
- Average case: $O(n/2)$
- Worst case: $O(n)$

Search list $\longrightarrow$ End of list

n comparisons

Final Answer: O(n)

Answer: (C)

Q31.

Solution

Concept: Different sorting algorithms have different efficiencies depending on dataset size and initial order. Insertion sort is particularly efficient for small datasets or nearly sorted lists because it inserts elements into their correct position with minimal comparisons. It performs better than quadratic algorithms like bubble and selection sort in such cases. Merge sort is efficient for large datasets but has overhead for small ones.

Solution: The question asks which sorting algorithm is best for small or partially sorted datasets. Insertion sort adapts well to nearly sorted data and requires fewer shifts and comparisons in such cases. Bubble sort is generally slower, selection sort does not adapt to input order, and merge sort has higher overhead. Therefore, the correct answer is Insertion Sort.

Final Answer: Insertion Sort

Answer: (C)

Q32.

Solution

Concept: In Selection Sort, the smallest (or largest) element is selected in each pass and placed in its correct position.

Key Idea:

- For n elements, number of passes required = $n - 1$

Explanation:

- Pass 1: place smallest element
- Pass 2: second smallest
- Pass 3: third smallest
- Pass 4: fourth smallest
- Last element is automatically sorted

$$\underset{n-1}{\text{5 elements}} \longrightarrow \text{4 passes}$$

Final Answer: 4

Answer: (B)

Q33.

Solution

Concept: Binary Search is an efficient searching algorithm that works by repeatedly dividing a sorted array into halves. It compares the target value with the middle element and eliminates half of the search space in each step. Because of this divide-and-conquer approach, the array must be sorted; otherwise, comparisons would not correctly determine which half to search.

Solution: The question asks about the required condition for Binary Search. Since Binary Search relies on ordered data to decide whether to move left or right, the array must be sorted in ascending or descending order. If the array is unsorted, the algorithm will not function correctly. Therefore, the correct answer is Sorted.

Final Answer: Sorted

Answer: (B)

Q34.

Solution

Concept: Sorting algorithms often maintain a separation between sorted and unsorted portions of a dataset during execution. Insertion sort builds a sorted sub-list by taking elements one by one from the unsorted part and inserting them into the correct position. This approach is similar to arranging playing cards in hand. It is efficient for small or nearly sorted datasets.

Solution: The question asks which technique maintains a sorted sub-list and an unsorted sub-list. In insertion sort, the left part of the array becomes sorted gradually, while the right part remains unsorted. Linear search is not a sorting method, bubble sort swaps adjacent elements, and selection sort repeatedly selects minimum elements but does not insert into a growing sorted sub-list in the same way. Therefore, the correct answer is Insertion Sort.

Final Answer: Insertion Sort

Answer: (B)

Q35.

Solution

Concept: Binary Search works by comparing the target value with the middle element of a sorted list. Based on this comparison, it decides which half of the array may contain the target. If the middle element is smaller than the target, the search continues in the right half; otherwise, it continues in the left half. This reduces the search space efficiently.

Solution: In an ascending sorted list, if the middle element is less than the target value, then all elements in the left half are also smaller than the target. Therefore, the target must lie in the right half. Hence, the search continues in the right half of the array.

Final Answer: The right half

Answer: (B)

Q36.

Solution

Concept: Exception handling in Python allows programs to handle runtime errors gracefully without crashing. The `try` block is used to write code that may potentially raise an exception. If an error occurs, control is transferred to the appropriate `except` block. This structure helps maintain program stability and allows proper error management.

Solution: The question asks which block is used to write code that may raise an exception. In Python, the `try` block contains the code that is monitored for errors. If an exception occurs, it is caught by the `except` block. Therefore, the correct answer is try.

Final Answer: try

Answer: (C)

Q37.

Solution

Concept: In Python exception handling, the `finally` block is used to define cleanup code that must execute regardless of whether an exception occurs or not. It is typically used for closing files, releasing resources, or performing final operations. The `finally` block ensures that important code always runs, improving program reliability.

Solution: The question asks about the purpose of the `finally` block. It executes code regardless of whether an exception occurs in the `try` block or not. It is not dependent on success or failure of execution and is not used to stop the program. Therefore, its correct purpose is to execute code regardless of whether an error occurred.

Final Answer: To execute code regardless of whether an error occurred

Answer: (C)

Q38.

Solution

Concept: File handling in Python provides different methods to write data into files depending on the type of data. When multiple strings need to be written to a file, Python offers specific functions to handle sequences efficiently. Understanding these methods is important for working with text files, logging data, and storing structured output. The correct method ensures that each string in a list is written properly to the file without manual looping.

Solution: The question asks which method is used to write a list of strings into a file. The `write()` method writes a single string, whereas `writelines()` is designed to write a sequence of strings (such as a list) directly into a file. It does not automatically add newline characters unless specified. The options `putlines()` and `listwrite()` are not valid Python methods. Therefore, the correct method for writing a list of strings is `writelines()`.

Final Answer: writelines()

Answer: (B)

Q39.

Solution

Concept: In Python file handling, the file pointer indicates the current position within a file. The `seek()` function is used to move this pointer to a specific location. It takes two arguments: the offset and the reference point. When the reference point is 0 (start), 1 (current), or 2 (end), the pointer is moved accordingly. This is useful for reading or writing data from specific positions in a file.

Solution: The command `seek(0, 2)` moves the file pointer based on the second argument, where 2 represents the end of the file. The offset 0 means no movement from that reference point. Therefore, the file pointer is positioned at the end of the file. This is commonly used when appending data. Hence, the correct answer is the end of the file.

Final Answer: The end of the file

Answer: (B)

Q40.

Solution

Concept: In Python, serialization is the process of converting an object into a byte stream for storage or transmission, and deserialization is the reverse process. The `pickle` module is specifically designed for this purpose. It allows complex Python objects such as lists, dictionaries, and class instances to be stored in binary files and later restored.

Solution: The question asks which module is used for serializing and de-serializing data in binary files. The correct module is `pickle`, which provides functions like `dump()` and `load()` for this purpose. The `os` and `sys` modules are used for operating system interactions and system-specific parameters, not serialization. Therefore, the correct answer is pickle.

Final Answer: pickle

Answer: (C)

Q41.

Solution

Concept: File modes in Python define how a file is opened and accessed. The mode 'a' stands for append mode, which allows data to be added at the end of an existing file without overwriting its contents. If the file does not exist, it creates a new file. This mode is useful for logging and incremental data storage.

Solution: The question asks what the 'a' mode signifies. In Python file handling, 'a' stands for append mode. It allows new data to be written at the end of the file while preserving existing content. Other options like access, abort, or add are not valid file modes in Python. Therefore, the correct answer is Append.

Final Answer: Append

Answer: (B)

Q42.

Solution

Concept: In Python, exceptions are errors that occur during program execution. The language provides specific exception types for different error conditions. When a division operation is performed and the denominator is zero, Python raises a specific built-in exception. Understanding exception types helps in writing robust error-handling code using try-except blocks.

Solution: The question asks which exception is raised when dividing by zero. In Python, dividing a number by zero raises a `ZeroDivisionError`. ValueError and ArithmeticError are broader categories, but the specific exception for this case is ZeroDivisionError. DivideByZero is not a valid Python exception. Therefore, the correct answer is ZeroDivisionError.

Final Answer: ZeroDivisionError

Answer: (C)

Q43.

Solution

Concept: File reading functions in Python allow extraction of data from files in different formats. The `read(n)` function reads a specific number of bytes or characters from a file. If no argument is provided, it reads the entire file. This function is useful for controlled reading of large files where partial data access is required.

Solution: The question asks what `read(n)` reads. The parameter n specifies the number of characters (in text mode) or bytes (in binary mode) to read from the file. It does not refer to lines or words. Therefore, the correct interpretation is that it reads n characters or bytes from the file.

Final Answer: n characters (or bytes)

Answer: (B)

Q44.

Solution

Concept: Network protocols define rules for communication and data transfer between devices over a network. Different protocols are used for different purposes such as web browsing, email transfer, and file transfer. Secure file transfer protocols ensure encryption and safe transmission of data between a client and a server. Understanding these protocols is important for network security and data protection in real-world applications.

Solution: The question asks which protocol is used for securely transferring files between a client and a server. HTTP is used for web communication but is not secure by default. FTP is used for file transfer but does not provide encryption. SMTP is used for sending emails. SCP and SFTP are secure protocols that provide encrypted file transfer over a network. Therefore, the correct answer is SCP/SFTP, as they ensure secure communication during file transfer.

Final Answer: SCP/SFTP

Answer: (D)

Q45.

Solution

Concept: Network protocols define rules for communication between devices over a network. When data security is required, encryption mechanisms like SSL/TLS are used to protect information from unauthorized access. Secure protocols ensure confidentiality, integrity, and authentication during data exchange. In web communication, secure browsing is achieved by combining HTTP with SSL/TLS encryption, resulting in a secure version of the protocol that is widely used for safe internet transactions.

Solution: The question asks which protocol is responsible for secure data transfer between a web browser and a web server using SSL/TLS encryption. HTTP is the basic web protocol but does not provide security. FTP is used for file transfer and SMTP is used for email transmission. The secure version of HTTP that uses SSL/TLS encryption is HTTPS. It ensures that data exchanged between the browser and server is encrypted, preventing interception or tampering by attackers. HTTPS also provides authentication of the website, ensuring users are connected to a legitimate server. Therefore, among the given options, HTTPS is the correct protocol used for secure web communication.

Final Answer: HTTPS

Answer: (C)

Q46.

Solution

Concept: Data transmission in computer networks can be performed using different switching techniques. Packet switching is a method where data is broken into small packets and each packet is sent independently over the network. These packets may take different routes and are reassembled at the destination. This method is efficient and widely used in modern networks like the Internet.

Solution: The question asks which switching technique breaks data into small blocks and sends them independently. Circuit switching establishes a dedicated path, message switching sends complete messages, and line switching is not a standard term. Packet switching divides data into packets and transmits them independently. Therefore, the correct answer is Packet Switching.

Final Answer: Packet Switching

Answer: (B)

Q47.

Solution

Concept: Computer security threats include various types of malicious software designed to harm systems or steal data. A worm is a self-replicating program that spreads automatically across networks without requiring human intervention. Unlike viruses, worms do not need a host file to spread. Understanding malware types is essential for cybersecurity and protecting systems from attacks.

Solution: The question describes a self-replicating program that spreads over a network without human intervention. This definition matches a worm. A virus requires a host file, a Trojan horse disguises itself as legitimate software, and spyware collects information secretly. Therefore, the correct answer is Worm.

Final Answer: Worm

Answer: (C)

Q48.

Solution

Concept: Cybersecurity threats involve various techniques used by attackers to steal sensitive information or disrupt normal communication. One common attack is phishing, where users are deceived into believing that a message comes from a legitimate source. This is usually done through fake emails or websites designed to look authentic. Understanding such threats is important for protecting personal and organizational data from unauthorized access.

Solution: The question describes a situation where users are tricked into revealing sensitive information through fake emails. This type of attack is known as phishing. In phishing, attackers impersonate trusted entities to steal credentials, banking details, or personal information. Denial of Service attacks aim to make a service unavailable, sniffing involves capturing network data, and spooling is related to print management. Therefore, the correct answer is Phishing.

Final Answer: Phishing

Answer: (A)

Q49.

Solution

Concept: Web communication requires protocols that ensure secure and reliable data transfer between clients and servers. HTTPS (HyperText Transfer Protocol Secure) is an extension of HTTP that uses encryption protocols such as SSL/TLS to secure data transmission. It ensures confidentiality, integrity, and authentication while browsing websites. Other protocols like FTP, TCP/IP, and DNS serve different networking purposes.

Solution: The question asks which protocol is used by web browsers to securely fetch web pages. HTTPS is the correct answer because it encrypts communication between the browser and the web server, preventing unauthorized access. TCP/IP is a communication protocol suite, FTP is used for file transfer, and DNS is used for domain name resolution. Therefore, the correct answer is HTTPS.

Final Answer: HTTPS

Answer: (B)

Q50.

Solution

Concept: Circuit switching is a communication method in which a dedicated communication path is established between the sender and receiver before data transfer begins. This path remains reserved for the entire session, ensuring consistent bandwidth and reliable communication. It is commonly used in traditional telephone networks. Understanding switching techniques is important for comparing different network communication models.

Solution: The statement says that in circuit switching, a dedicated physical path is established between sender and receiver. This is correct because circuit switching reserves a fixed path for the entire communication session. Unlike packet switching, no sharing of paths occurs during transmission. Therefore, the statement is True.

Final Answer: True

Answer: (A)

Answer Key

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