

CUET-UG Information Practices Sample Paper-4

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 query `SELECT POWER(3,4);` ?

- (A) 12
- (B) 27
- (C) 81
- (D) 64

Q2. Which SQL function removes leading spaces from a string?

- (A) RTRIM()
- (B) TRIM()
- (C) LTRIM()
- (D) SPACE()

Q3. What will be the output of `SELECT DAYNAME('2026-05-07');` ?

- (A) Wednesday
- (B) Thursday
- (C) Friday
- (D) Saturday



- Q4.** Which SQL function returns the absolute value of a number?
- (A) MOD()
 - (B) ABS()
 - (C) ROUND()
 - (D) CEIL()
- Q5.** Which constraint ensures that a column cannot store duplicate values?
- (A) NOT NULL
 - (B) UNIQUE
 - (C) DEFAULT
 - (D) CHECK
- Q6.** Which normal form removes partial dependency from a relation?
- (A) 1NF
 - (B) 2NF
 - (C) 3NF
 - (D) BCNF
- Q7.** Which topology uses a central connecting device like a switch or hub?
- (A) Ring
 - (B) Bus
 - (C) Star
 - (D) Mesh
- Q8.** Which networking device is primarily responsible for selecting the best path between networks?
- (A) Switch
 - (B) Router



- (C) Repeater
- (D) Hub

Q9. Which Pandas attribute returns the total number of elements in a DataFrame?

- (A) `df.shape`
- (B) `df.size`
- (C) `df.count`
- (D) `df.total`

Q10. What will `df.iloc[1,2]` return?

- (A) Entire row
- (B) Entire column
- (C) Single value at row index 1 and column index 2
- (D) Error always

Q11. Which function is used to detect missing values in Pandas?

- (A) `isnull()`
- (B) `missing()`
- (C) `detectnull()`
- (D) `isnone()`

Q12. Which method is used to rename columns in a DataFrame?

- (A) `rename()`
- (B) `alter()`
- (C) `modify()`
- (D) `columnchange()`



- Q13.** What will be the output of `len(pd.Series([1,2,3,4]))` ?
- (A) 3
 - (B) 4
 - (C) 5
 - (D) Error
- Q14.** Which argument in `to_csv()` prevents row indices from being written to the file?
- (A) `index=False`
 - (B) `row=False`
 - (C) `header=False`
 - (D) `columns=False`
- Q15.** Which function is used to merge two DataFrames based on a common column?
- (A) `append()`
 - (B) `concat()`
 - (C) `merge()`
 - (D) `stack()`
- Q16.** Which operation is performed by `df.drop('Marks', axis=1)` ?
- (A) Deletes a row
 - (B) Deletes a column
 - (C) Renames a column
 - (D) Sorts the DataFrame
- Q17.** What does `df.values` return?
- (A) Index labels
 - (B) NumPy representation of DataFrame data



- (C) Column names only
- (D) Statistical summary

Q18. Which SQL statement correctly displays the maximum salary department-wise?

- (A) `SELECT dept, MAX(salary) FROM emp GROUP BY dept;`
- (B) `SELECT MAX(dept) FROM emp;`
- (C) `SELECT dept FROM emp HAVING MAX(salary);`
- (D) `SELECT GROUP dept MAX(salary);`

Q19. Which clause is executed first in an SQL query?

- (A) SELECT
- (B) ORDER BY
- (C) FROM
- (D) HAVING

Q20. Which join returns only matching rows from both tables?

- (A) LEFT JOIN
- (B) RIGHT JOIN
- (C) INNER JOIN
- (D) FULL JOIN

Q21. Which aggregate function returns the number of non-NULL values in a column?

- (A) SUM()
- (B) AVG()
- (C) COUNT()
- (D) TOTAL()



- Q22.** What is the purpose of the ORDER BY clause?
- (A) Group rows
 - (B) Filter records
 - (C) Sort query results
 - (D) Create tables
- Q23.** Which Matplotlib function is used to create a pie chart?
- (A) plt.circle()
 - (B) plt.pie()
 - (C) plt.hist()
 - (D) plt.slice()
- Q24.** Which argument changes the color of bars in plt.bar() ?
- (A) shade
 - (B) style
 - (C) color
 - (D) filltype
- Q25.** Which command displays the graph window in Matplotlib?
- (A) plt.graph()
 - (B) plt.show()
 - (C) plt.display()
 - (D) plt.render()
- Q26.** Which chart is most suitable for comparing quantities across categories?
- (A) Histogram
 - (B) Pie Chart
 - (C) Bar Graph



(D) Line Plot

Q27. What is cyber stalking?

- (A) Monitoring or harassing a person using digital communication
- (B) Creating backup copies of data
- (C) Encrypting information online
- (D) Improving internet speed

Q28. Which of the following is an example of open-source software?

- (A) MS Excel
- (B) Windows
- (C) Linux
- (D) Oracle DB

Q29. Which law protects original literary and artistic works?

- (A) Patent Law
- (B) Trademark Law
- (C) Copyright Law
- (D) Cyber Law

Q30. Which practice helps reduce e-waste generation?

- (A) Frequent replacement of gadgets
- (B) Recycling electronic devices
- (C) Burning old devices
- (D) Storing damaged batteries openly



- Q31.** What will be the output of `SELECT INSTR('DATABASE', 'TA');` ?
- (A) 1
 - (B) 3
 - (C) 5
 - (D) 6
- Q32.** What will be the output of `SELECT REVERSE(UCASE('Cuet'));` ?
- (A) teuc
 - (B) TEUC
 - (C) CEUT
 - (D) TEUC
- Q33.** Which SQL function can be used to return the difference in days between two dates?
- (A) DATEDIFF()
 - (B) DAYCOUNT()
 - (C) DIFFDATE()
 - (D) SUBDATE()
- Q34.** In relational algebra, which operator is represented by the Greek symbol σ ?
- (A) Projection
 - (B) Join
 - (C) Selection
 - (D) Union
- Q35.** Which type of key uniquely identifies each record and can consist of multiple columns?
- (A) Alternate Key



- (B) Composite Primary Key
- (C) Foreign Key
- (D) Secondary Key

Q36. Which network topology provides the highest redundancy because every node is connected to every other node?

- (A) Bus
- (B) Star
- (C) Ring
- (D) Mesh

Q37. Which protocol is responsible for assigning IP addresses automatically to devices in a network?

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

Q38. What will be the output of `pd.Series([5,10,15]).mean()` ?

- (A) 5
- (B) 10
- (C) 15
- (D) 30

Q39. Which Pandas method is used to permanently remove duplicate rows from a DataFrame?

- (A) `remove_duplicates()`
- (B) `drop_duplicates()`
- (C) `delete_duplicates()`



(D) `clear_duplicates()`

Q40. What will be returned by `df.ndim` for a DataFrame?

(A) 0

(B) 1

(C) 2

(D) Depends on rows

Q41. Which parameter in `read_csv()` is used to specify a different delimiter?

(A) `split`

(B) `delimiter / sep`

(C) `divide`

(D) `token`

Q42. What is the output of `df.columns.values` ?

(A) Total rows

(B) NumPy array of column labels

(C) Dictionary of columns

(D) DataFrame summary

Q43. Which SQL clause is used to display records in descending order of marks?

(A) `ORDER BY marks DESC`

(B) `SORT marks DESC`

(C) `GROUP BY marks DESC`

(D) `ORDER DESC marks`

Q44. Which query correctly finds the minimum salary from table `employee`?

(A) `SELECT LOWEST(salary) FROM employee;`



- (B) `SELECT MIN(salary) FROM employee;`
- (C) `SELECT SMALL(salary) FROM employee;`
- (D) `SELECT LEAST(salary) FROM employee;`

Q45. Which SQL join returns all records from the left table and matching records from the right table?

- (A) RIGHT JOIN
- (B) INNER JOIN
- (C) LEFT JOIN
- (D) FULL JOIN

Q46. Which Matplotlib function is used to create a scatter plot?

- (A) `plt.scatter()`
- (B) `plt.plot()`
- (C) `plt.graph()`
- (D) `plt.mark()`

Q47. Which argument in `plt.pie()` displays percentage values on the chart?

- (A) percent
- (B) percentage
- (C) autopct
- (D) showpct

Q48. Which cyber attack attempts to flood a network or server with excessive traffic?

- (A) Phishing
- (B) DoS Attack
- (C) Spoofing
- (D) Sniffing



- Q49.** Which term refers to software that secretly records user activities such as keystrokes?
- (A) Antivirus
 - (B) Firewall
 - (C) Spyware
 - (D) Compiler
- Q50.** Which of the following is considered unethical use of digital resources?
- (A) Using licensed software
 - (B) Creating data backups
 - (C) Software piracy
 - (D) Encrypting confidential data



Detailed Solutions**Q1.****Solution**

Concept: Arithmetic functions and exponentiation in Structured Query Language (SQL).

Solution: In SQL, mathematical calculations can be performed using built-in numeric functions. The `POWER(base, exponent)` function is used to raise a number to a specified power.

(a) **Function Syntax:**

The syntax of the function is:

$$\text{POWER}(m, n)$$

which calculates:

$$m^n$$

(b) **Given Query:**

```
SELECT POWER(3,4);
```

Here:

- Base = 3
- Exponent = 4

(c) **Calculation:**

$$3^4 = 3 \times 3 \times 3 \times 3$$

(d) **Step-by-Step Multiplication:**

- $3 \times 3 = 9$
- $9 \times 3 = 27$
- $27 \times 3 = 81$

(e) **Result:**

Therefore, the query returns:

81

Final Answer: "81"

Answer: (C)



Q2.

Solution

Concept: String manipulation and data sanitation using trimming functions.

Solution: When data is imported from external sources or entered manually, it often contains leading or trailing spaces that can interfere with string comparisons, indexing, and sorting. SQL provides a suite of trimming functions to clean these strings:

- **LTRIM(string):** Short for "Left Trim." This function scans the string from the beginning and removes all space characters encountered until it reaches the first non-space character. It only affects the "leading" side.
- **RTRIM(string):** Short for "Right Trim." This function removes spaces from the end of the string (the trailing side).
- **TRIM(string):** A comprehensive function that removes white spaces from both ends of the string simultaneously.
- **SPACE(n):** This is used to create a string consisting of n n space characters, not for removing them.

Since the requirement is specifically to remove *leading* spaces (those at the start of the string), LTRIM() is the only appropriate choice.

Final Answer : "LTRIM()"

Answer: (C)



Q3.

Solution

Concept: SQL Date functions and calendar-based calculations.

Solution: The DAYNAME() function takes a date value (either in 'YYYY-MM-DD' string format or as a DATE object) and returns the full name of the day of the week for that specific date. To find the result for '2026-05-07', we look at the calendar progression:

- (a) **Reference Point:** May 7, 2024, was a Tuesday.
- (b) **2025 Progression:** 2025 is a common year with 365 days. Since $365 \div 7$ leaves a remainder of 1, the day of the week shifts forward by one day. Therefore, May 7, 2025, will be a Wednesday.
- (c) **2026 Progression:** 2026 is also a common year with 365 days. The day shifts forward by one more day.
- (d) **Final Calculation:** One day after Wednesday is Thursday.

Consequently, the query `SELECT DAYNAME('2026-05-07');` will output 'Thursday'.

Final Answer : "Thursday"

Answer: (B)



Q4.

Solution

Concept: Handling numeric magnitudes using SQL mathematical functions.

Solution: In mathematics and computing, the absolute value is the non-negative value of a number without regard to its sign. It represents the distance of the number from zero on a number line.

- **ABS(x):** This function converts negative numbers into positive ones while leaving positive numbers unchanged. Example: $ABS(-10.5)$ returns 10.5.
- **MOD(n, m):** This is the modulo operator; it returns the remainder of a division operation (e.g., $MOD(10, 3)$ returns 1).
- **ROUND(x):** This is used to approximate a number to the nearest integer or decimal place.
- **CEIL(x):** This returns the smallest integer that is greater than or equal to the input (e.g., $CEIL(4.1)$ returns 5).

The functionality described in the question—returning the absolute value—is exclusively performed by the $ABS()$ function.

Final Answer : “ABS()”

Answer: (B)



Q5.

Solution

Concept: Enforcing data integrity through RDBMS constraints.

Solution: Constraints are rules defined at the table level to ensure the reliability and accuracy of the data. To prevent redundant or duplicate entries in a column (like an ID or email address), we apply specific constraints:

- **UNIQUE:** This constraint guarantees that all values in a column are distinct. Unlike a Primary Key, a table can have multiple UNIQUE columns, and most databases allow one NULL value in a UNIQUE column.
- **NOT NULL:** This simply prevents the column from being empty but does not check for duplicates.
- **DEFAULT:** This provides a value automatically when the user leaves a column blank; it has no role in preventing duplicates.
- **CHECK:** This allows the user to specify a logical condition (e.g., $\text{Price} > 0$) that every row must satisfy.

Because the UNIQUE constraint is explicitly designed to maintain distinct values across all rows, it is the correct answer.

Final Answer : “UNIQUE”

Answer: (B)



Q6.

Solution

Concept: Database Normalization and the removal of redundancy.

Solution: Normalization is a systematic approach to decomposing tables to eliminate data redundancy and undesirable anomalies.

- **1NF (First Normal Form):** Requires that all data is atomic (no lists or groups in a single cell) and that each row is unique.
- **2NF (Second Normal Form):** A relation is in 2NF if it is already in 1NF and every non-prime attribute is fully functionally dependent on the primary key. This step is specifically responsible for **removing partial dependencies**. A partial dependency exists when a non-key attribute depends on only a portion of a composite primary key.
- **3NF (Third Normal Form):** Focuses on removing transitive dependencies (where a non-key attribute depends on another non-key attribute).

The question specifically targets the removal of partial dependency, which is the defining requirement for achieving the Second Normal Form.

Final Answer : “2NF”

Answer: (B)



Q7.

Solution

Concept: Physical network topologies and centralized connectivity.

Solution: In computer networking, topology refers to the geometric arrangement of various nodes.

- **Star Topology:** This is the most common layout in modern Ethernet LANs. Every individual computer is connected via its own cable to a **central connection point** (usually a switch or a hub). All communications between devices must travel through this central node. If one device's cable breaks, only that device is disconnected; the rest of the network continues to function.
- **Bus Topology:** Uses a single shared backbone cable.
- **Ring Topology:** Connects nodes in a circular loop where data travels in one direction.
- **Mesh Topology:** Every node is connected to every other node for maximum redundancy.

The central connecting device (Switch/Hub) is the hallmark of the Star Topology.

Final Answer : "Star"

Answer: (C)



Q8.

Solution

Concept: Networking hardware and Layer 3 (Network Layer) operations.

Solution: Different hardware devices serve different functions in a network based on the OSI model:

- **Router:** A Router is a Layer 3 device that connects two or more different networks. Its primary purpose is to receive data packets, examine the destination IP address, and use a "Routing Table" to **select the best path** for the packet to reach its destination.
- **Switch:** A Layer 2 device that connects devices within the same network. It uses MAC addresses rather than finding "best paths" between networks.
- **Repeater:** A physical layer device that simply regenerates an electrical signal to extend its range.
- **Hub:** A basic device that broadcasts incoming data to all its ports without any intelligence or path selection.

Because the question emphasizes path selection and working between networks, the Router is the correct device.

Final Answer : "Router"

Answer: (B)



Q9.

Solution

Concept: Pandas library attributes for inspecting DataFrame metadata.

Solution: Pandas provides several attributes and methods to determine the size and shape of the data structure.

- **df.size:** This attribute returns an integer representing the **total number of elements** (the number of rows multiplied by the number of columns). It includes all cells, including those that contain NaN or missing values.
- **df.shape:** This returns a tuple (e.g., (50, 4)) showing the number of rows and columns, but not the total element count directly.
- **df.count():** This is a method that returns a Series showing the number of *non-null* values in each column; it does not provide the total size of the grid.
- **df.total:** This is not a valid attribute in the Pandas library.

To get the total number of all elements in the entire DataFrame, `df.size` is the correct attribute.

Final Answer : “df.size”

Answer: (B)



Q10.

Solution

Concept: Integer-location based indexing and data selection in Pandas DataFrames.

Solution: Pandas provides two primary ways to select data: `.loc` (label-based) and `.iloc` (integer-position based).

- (a) **Understanding iloc:** The `.iloc` indexer is used to select data by its numerical position, starting from 0. The syntax follows the pattern `df.iloc[row_index, column_index]`.
- (b) **Row Selection:** The first argument 1 refers to the index position 1. Since Python uses zero-based indexing, this corresponds to the second row of the DataFrame.
- (c) **Column Selection:** The second argument 2 refers to the index position 2. This corresponds to the third column of the DataFrame.
- (d) **Data Retrieval:** When both a specific row and a specific column are identified by integers, the intersection is a single data point (a scalar value). If only the row index was provided (e.g., `df.iloc[1]`), it would return a Series representing the entire row. However, specifying both coordinates pinpoint a specific cell.

Final Answer : “Single value at row index 1 and column index 2”

Answer: (C)

Q11.

Solution

Concept: Data cleaning and identification of missing or null values in Pandas.

Solution: In real-world datasets, data is often missing or incomplete, represented in Pandas as NaN (Not a Number) or None. Identifying these gaps is the first step in data preprocessing.

- **isnull():** This is a built-in Pandas function that scans each element in a DataFrame or Series. It returns a boolean object (True/False) of the same shape, where True indicates a missing value and False indicates valid data.
- **isna():** This is a direct alias for `isnull()`. Both functions are used interchangeably in the Pandas library.
- **Usage:** A common workflow is to use `df.isnull().sum()`, which calculates the total number of missing values per column.
- **Invalid Options:** `missing()`, `detectnull()`, and `isnone()` are not recognized methods in the standard Pandas library API for detecting null values.

Final Answer : “isnull()”

Answer: (A)



Q12.

Solution

Concept: DataFrame manipulation and modification of column metadata.

Solution: Modifying column headers is a common task in data restructuring. Pandas provides the `rename()` method specifically for this purpose.

- **Syntax:** The most common way to use this is `df.rename(columns='old_name': 'new_name')`. By using a dictionary, you can rename one or multiple columns simultaneously without affecting the others.
- **Persistence:** By default, `rename()` returns a new DataFrame. To modify the existing DataFrame directly, the `inplace=True` parameter must be used.
- **Other Options:** While you can rename all columns by assigning a list to `df.columns`, `rename()` is the preferred method for selective changes. Functions like `alter()`, `modify()`, or `columnschange()` are SQL-style or made-up terms and do not exist in Pandas.

Final Answer : “`rename()`”

Answer: (A)

Q13.

Solution

Concept: Size properties of a Pandas Series and Python’s length function.

Solution: A Pandas Series is a one-dimensional array-like object that contains a sequence of values and an associated array of data labels called its index.

- Input Data:** The constructor `pd.Series([1, 2, 3, 4])` takes a Python list as input. The list contains four distinct elements.
- Function Application:** The `len()` function in Python is a built-in function that returns the number of items in an object. When applied to a Series, it counts the total number of entries in that Series.
- Analysis:** The Series generated here will have the values 1, 2, 3, and 4. Therefore, the total count of elements is 4.
- Index vs. Length:** Although the index labels will be 0, 1, 2, and 3 (total of four positions), the length is simply the count of elements, which is 4.

Final Answer : “4”

Answer: (B)



Q14.

Solution

Concept: Controlling output format during DataFrame export to CSV.

Solution: The `to_csv()` method is used to save a DataFrame into a comma-separated values (CSV) file. By default, Pandas includes the row labels (`index`) as the first column in the resulting file.

- **Default Behavior:** If a DataFrame has indices 0, 1, 2..., these will appear as a nameless first column in the CSV.
- **The `index=False` Argument:** Often, these indices are just row numbers and are not part of the actual data. Setting `index=False` instructs Pandas to omit the index column entirely during the write process.
- **Distinction:**
 - `header=False`: Removes the column names from the first row.
 - `columns`: Specifies which specific columns to include.

To specifically exclude the row identifiers, `index=False` is the mandatory parameter.

Final Answer : “`index=False`”

Answer: (A)



Q15.

Solution

Concept: Merging datasets based on relational logic and shared keys.

Solution: In data analysis, it is frequently necessary to combine two DataFrames that share a common attribute (like an 'ID' or 'Name' column).

- **merge():** This is the standard Pandas function for performing database-style joins. It aligns rows based on the values in one or more common columns. It supports `inner`, `left`, `right`, and `outer` joins, similar to SQL.
- **concat():** This is used to "glue" DataFrames together along an axis (either stacking them vertically or placing them side-by-side) but does not perform logical joins based on values.
- **append():** A simplified version of concatenation used to add new rows to the end of a DataFrame (note: this is deprecated in newer versions of Pandas).
- **stack():** Used to reshape data by "compressing" a level of the column labels into the index.

For joining based on a common column, `merge()` is the correct tool.

Final Answer : "merge()"

Answer: (C)

Q16.

Solution

Concept: Structural deletion in DataFrames using the axis parameter.

Solution: The `drop()` method is used to remove specified labels from rows or columns. The `axis` parameter is critical as it tells Pandas which direction to look:

- **axis=0 (or 'index'):** This refers to the vertical axis. Dropping here will remove a row matching the specified label.
- **axis=1 (or 'columns'):** This refers to the horizontal axis. Dropping here will remove a column matching the specified label.

In the command `df.drop('Marks', axis=1)`, the string 'Marks' is the name of the column, and `axis=1` confirms that the operation should search the column headers for this label. As a result, the entire 'Marks' column is deleted from the DataFrame.

Final Answer : "Deletes a column"

Answer: (B)



Q17.

Solution

Concept: Converting Pandas objects to raw NumPy arrays.

Solution: Pandas is built on top of NumPy, a library for numerical computing. While a DataFrame adds a lot of functionality like labels and different data types, the core data is stored in a grid-like format.

- **df.values:** This attribute accesses the underlying data of the DataFrame and returns it as a NumPy ndarray. This is useful when you want to use the data with other scientific libraries (like Scikit-Learn) that expect raw arrays instead of labeled DataFrames.
- **What is removed:** When you call `.values`, the row indices and column headers are stripped away, leaving only the raw data values.
- **Modern Alternative:** While `.values` is still widely used, the Pandas documentation now recommends using `.to_numpy()` for more consistent behavior.

Final Answer : “NumPy representation of DataFrame data”

Answer: (B)

Q18.

Solution

Concept: Categorical aggregation in SQL using GROUP BY and MAX.

Solution: To retrieve the highest salary for every unique department in a table, we must use a grouping operation.

- Selecting the key:** We include `dept` in the SELECT list so we know which department the result belongs to.
- Calculating the aggregate:** We use `MAX(salary)` to identify the highest numeric value in the salary column within each group.
- Applying the group:** The `GROUP BY dept` clause is essential. It tells the SQL engine to collect all rows with the same department value together before calculating the maximum.

The complete query is: `SELECT dept, MAX(salary) FROM emp GROUP BY dept;`. This ensures that if there are 5 departments, the result set will have 5 rows, each showing a department name and its respective top salary.

Final Answer : “SELECT dept, MAX(salary) FROM emp GROUP BY dept;”

Answer: (A)



Q19.

Solution

Concept: The logical query execution order (Order of Operations) in SQL.

Solution: One of the most important concepts in SQL is that the query is not executed in the same order it is written. While a query starts with the **SELECT** statement, that is actually one of the *last* things the computer does. The logical order of execution is:

- (a) **FROM:** The computer must first identify the table or tables where the data is stored.
- (b) **WHERE:** Filters individual rows from the source.
- (c) **GROUP BY:** Segregates the filtered rows into groups.
- (d) **HAVING:** Filters the grouped results.
- (e) **SELECT:** Projects the columns and performs calculations.
- (f) **ORDER BY:** Sorts the final output for the user.

Since the system cannot filter, group, or select data without first knowing which table to use, the **FROM** clause is logically executed first.

Final Answer : “FROM”

Answer: (C)



Q20.

Solution

Concept: Relational Algebra and Intersection of datasets via SQL Joins.

Solution: In Structured Query Language (SQL), Joins are used to combine records from two or more tables based on a logical relationship between them. There are several types of joins, each following a specific set of rules:

- **INNER JOIN:** This join acts like the intersection operator in set theory. It returns only the rows that have matching values in both tables involved in the join. If a row in Table A has no match in Table B (based on the ON condition), that row is completely omitted from the result set.
- **LEFT JOIN:** Returns all records from the left table, and the matched records from the right table; unmatched rows from the right side show as NULL.
- **RIGHT JOIN:** Returns all records from the right table, and the matched records from the left table.
- **FULL OUTER JOIN:** Returns all records when there is a match in either left or right table records.

Since the objective is to retrieve *only* those records where a match exists on both sides, the **INNER JOIN** is the correct mathematical and logical choice.

Final Answer : “INNER JOIN”

Answer: (C)



Q21.

Solution

Concept: Aggregate data calculation and handling of missing values in SQL.

Solution: Aggregate functions perform a calculation on a column of data and return a single summary value. One of the most critical aspects of these functions is how they interact with NULL (missing) values.

- **COUNT(column_name):** This function is specifically designed to count the number of entries in a specific column that contain actual data. It ignores any row where the specified column is NULL.
- **COUNT():** Unlike COUNT(column_name), the COUNT() version counts every single row in the table, including rows that contain NULLs, because it counts the "record" rather than a specific "value."
- **SUM(), AVG(), MAX(), MIN():** While these functions also ignore NULL values during their calculations, they are used for addition, finding averages, or identifying extremes, rather than simply counting occurrences.

Therefore, COUNT() is the standard function used to determine the count of non-NULL values.

Final Answer : "COUNT"

Answer: (C)

Q22.

Solution

Concept: Data organization and presentation using the SQL ORDER BY clause.

Solution: The ORDER BY clause is used in a SELECT statement to control the physical sequence in which the records are displayed in the final output. Without an ORDER BY clause, the database may return records in any order (often the order in which they were inserted).

- **Sorting Direction:** It can sort data in Ascending order (ASC, which is the default) or Descending order (DESC).
- **Multi-column Sorting:** You can sort by multiple columns (e.g., ORDER BY department ASC, salary DESC).
- **Comparison:** It does not group rows (that is the job of GROUP BY), nor does it filter records (that is the job of WHERE). Its sole responsibility is the final arrangement of the data points for better readability and analysis.

Final Answer : "Sort query results"

Answer: (C)



Q23.

Solution

Concept: Data visualization for proportional data using the Matplotlib library.

Solution: Matplotlib's `pyplot` module provides specialized functions for different types of statistical graphics.

- **plt.pie():** This is the dedicated function for generating a pie chart. A pie chart represents data as slices of a circle, where the area and arc length of each slice are proportional to the percentage of the whole that the data point represents. It is highly effective for showing "part-to-whole" relationships.
- **Other Functions:**
 - `plt.hist()` is utilized for creating histograms to visualize frequency distributions of continuous variables.
 - `plt.bar()` is used for vertical or horizontal bar charts.
 - There are no standard functions named `plt.circle()` or `plt.slice()` within the `pyplot` API for data plotting.

Final Answer : “`plt.pie()`”

Answer: (B)

Q24.

Solution

Concept: Styling and aesthetic customization of Bar Charts in Matplotlib.

Solution: When using `plt.bar(x, height)`, the default color for the bars is usually blue. To make the chart more professional or to distinguish between different data series, Matplotlib allows users to customize the appearance of the bars.

- **The 'color' argument:** This keyword argument is the standard way to change the interior color of the bars. It can take single color names (e.g., 'red', 'green', 'magenta'), short color codes (e.g., 'k' for black, 'b' for blue), or even hexadecimal strings (e.g., '#4CAF50').
- **Advanced usage:** You can also pass a list of colors (e.g., `color=['red', 'blue', 'green']`) to give each individual bar in the chart a different color.

Parameters such as `shade`, `style`, or `filltype` are either non-existent in this context or serve entirely different purposes in other plotting libraries.

Final Answer : “`color`”

Answer: (C)



Q25.

Solution

Concept: Rendering and GUI management in the Matplotlib environment.

Solution: In Python's Matplotlib library, the process of creating a visualization happens in two main stages:

- (a) **Construction:** Commands like `plt.plot()`, `plt.xlabel()`, and `plt.title()` build the figure in the background (within the system memory).
- (b) **Display:** The `plt.show()` command is the trigger that instructs the library to interact with the operating system's graphics backend to open a window and render the constructed plot.

Without calling `plt.show()`, a script running in a standard terminal or environment might finish execution without ever popping up the window containing the graph. It also handles the "event loop," meaning it keeps the window open until the user manually closes it.

Final Answer : “`plt.show()`”

Answer: (B)

Q26.

Solution

Concept: Categorical data comparison and chart selection.

Solution: Selecting the correct chart is vital for effective data communication.

- **Bar Graph:** This chart is the industry standard for comparing quantities across different discrete categories (e.g., populations of different countries, sales of different car models). The length of the bar makes it very easy for the human eye to compare differences in magnitude between categories.
- **Histogram:** Often confused with bar charts, these are used for continuous data (like age ranges) to show distributions.
- **Pie Chart:** Useful only when looking at how parts make up 100
- **Line Plot:** Primarily used to show trends, such as how a value changes over a continuous time period.

Because the question focuses on comparing "quantities across categories," the Bar Graph is the most suitable tool.

Final Answer : “Bar Graph”

Answer: (C)



Q27.

Solution

Concept: Understanding cybercrimes and online harassment (Cyber Stalking).

Solution: Cyber stalking is a specific type of cybercrime and a form of social engineering or harassment.

- **Definition:** It involves a pattern of behavior where an attacker uses digital tools—such as social media, email, instant messaging, or GPS tracking—to persistently monitor, follow, or harass an individual.
- **Impact:** The intent is usually to intimidate, frighten, or cause emotional distress to the victim. It often involves gathering personal information about the victim to use in threats or public defamation.
- **Legal context:** In many jurisdictions, cyber stalking is a punishable offense under cyber laws. It is distinct from technical activities like data backup or encryption, which are positive security practices.

Final Answer : “Monitoring or harassing a person using digital communication”

Answer: (A)

Q28.

Solution

Concept: Software licensing models: Proprietary vs. Open-Source Software (OSS).

Solution: Software is categorized by how the source code is managed and shared with the public.

- **Open-Source Software (OSS):** This is software whose source code is released under a license in which the copyright holder grants users the rights to use, study, change, and distribute the software to anyone and for any purpose. **Linux** is the most prominent example of an open-source operating system.
- **Proprietary Software:** This is "closed-source" software. The source code is a trade secret owned by a company. For example, **MS Excel** and **Windows** are owned by Microsoft, and **Oracle DB** is owned by Oracle Corporation. Users only get a license to use the compiled program, not the right to see or modify the original code.

Final Answer : “Linux”

Answer: (C)



Q29.

Solution

Concept: Legal protections for creative works under Intellectual Property Rights (IPR).

Solution: Intellectual Property Rights (IPR) provide creators with legal ownership of their intangible assets.

- **Copyright Law:** This specific branch of IPR is designed to protect "expression of ideas." It covers **literary works** (books, software code), **artistic works** (paintings, photographs), and **musical/cinematic works**. It prevents others from copying, performing, or distributing the work without the author's permission.
- **Patent Law:** Protects inventions, machines, and industrial processes.
- **Trademark Law:** Protects brand names, logos, and slogans.
- **Cyber Law:** A broader legal field dealing with the internet, computing, and related legal issues like cybercrime and electronic commerce.

Final Answer : "Copyright Law"

Answer: (C)



Q30.

Solution

Concept: Sustainable practices and E-waste mitigation strategies.

Solution: Electronic Waste (E-waste) is one of the fastest-growing waste streams in the world. It contains toxic substances like lead, cadmium, and mercury which can cause severe environmental damage.

- **Recycling:** This is the practice of extracting valuable materials (like copper, gold, and aluminum) from discarded electronics and using them to create new products. This reduces the need for mining new raw materials and ensures that toxic components are handled in specialized facilities rather than being dumped in landfills.
- **Incorrect Practices:**
 - Frequent replacement of gadgets *increases* e-waste.
 - Burning devices releases toxic chemicals into the air.
 - Storing damaged batteries openly is a fire and chemical hazard.

Hence, responsible recycling is the primary method for reducing e-waste.

Final Answer : “Recycling electronic devices”

Answer: (B)



Q31.

Solution

Concept: String searching and position retrieval using SQL INSTR function.

Solution: The INSTR(string, substring) function is a built-in SQL function used to locate the position of the first occurrence of a specific substring within a parent string.

- (a) **1-Based Indexing:** It is vital to note that in standard SQL (like MySQL), string indexing begins at 1, not 0.
- (b) **Mapping the String:** Let us look at the word 'DATABASE' character by character:
- Position 1: D
 - Position 2: A
 - Position 3: T
 - Position 4: A
 - Position 5: B
 - Position 6: A
 - Position 7: S
 - Position 8: E
- (c) **Matching the Substring:** We are searching for 'TA'. By observing the positions above, the letter 'T' appears at position 3 and is immediately followed by 'A' at position 4.
- (d) **Result:** The function returns the starting index of the first match. Since the match starts at the third character, the output is 3.

Final Answer : "3"

Answer: (B)



Q32.

Solution

Concept: Function nesting and string transformation (Reversal and Case Conversion).

Solution: In SQL, when functions are nested, the computer follows the "Inside-Out" rule, meaning the innermost function is executed first and its result is handed to the next level.

- (a) **Step 1 (Innermost): UCASE('Cuet')**: The UCASE() (or UPPER()) function converts all characters in a string to their uppercase counterparts. 'Cuet' becomes 'CUET'.
- (b) **Step 2 (Outer): REVERSE('CUET')**: The REVERSE() function takes the uppercase string and flips the character order entirely.
 - First character becomes last, last becomes first.
 - 'C-U-E-T' becomes 'T-E-U-C'.
- (c) **Case Integrity:** Since the string was already converted to uppercase in Step 1, the reversed output remains in uppercase. Thus, the final result is 'TEUC'.

Final Answer : "TEUC"

Answer: (B)

Q33.

Solution

Concept: Temporal data arithmetic and calculating date intervals.

Solution: Database systems frequently need to calculate the duration between two events. SQL provides specialized temporal functions for this:

- **DATEDIFF(expr1, expr2):** This function calculates the difference between two dates. In MySQL, it specifically returns the result as an integer representing the number of **days** from *expr2* to *expr1*.
- **Example:** DATEDIFF('2023-12-31', '2023-12-01') would return 30.
- **Invalid Options:**
 - DAYCOUNT() and DIFFDATE() are not standard built-in SQL functions.
 - SUBDATE() is used to subtract a specific time interval (like 5 days) from a date to find a past date, rather than finding the difference between two fixed dates.

Final Answer : "DATEDIFF()"

Answer: (A)



Q34.

Solution

Concept: Relational Algebra notation and set-based operations.

Solution: Relational Algebra forms the theoretical foundation of SQL. Different Greek symbols are used to represent various operations.

- **Selection (σ):**

The lowercase Sigma symbol (σ) denotes the **Selection** operation. It is a unary operator used to retrieve only those tuples (rows) from a relation that satisfy a given condition.

Example:

$$\sigma_{\text{salary} > 5000}(\text{Employee})$$

This operation is similar to the WHERE clause in SQL.

- **Projection (π):**

The Pi symbol (π) is used to select specific columns (attributes) from a relation.

- **Join (\bowtie):**

The Join operator combines two relations based on a common attribute.

- **Union (\cup):**

The Union operator merges the results of two compatible relations into a single set.

Since the symbol σ is used for filtering rows based on a condition, it represents the **Selection** operator.

Final Answer: “Selection”

Answer: (C)



Q35.

Solution

Concept: Unique identification using multi-attribute keys.

Solution: In a relational database, every row must be unique. While usually a single column (like ID) is enough, some scenarios require more data to ensure uniqueness.

- **Composite Primary Key:** This is a Primary Key that consists of **two or more columns**. No single column in this group is unique on its own, but their combination is guaranteed to be unique across the table.
- **Example:** In a 'ClassEnrollment' table, a student can be in many classes and a class can have many students. Neither StudentID nor ClassID can be a primary key alone. However, the combination of (StudentID, ClassID) uniquely identifies a specific enrollment.
- **Foreign Key:** Used to link two tables.
- **Alternate Key:** A candidate key not chosen as the primary key.

Final Answer : “Composite Primary Key”

Answer: (B)

Q36.

Solution

Concept: Network topology robustness and fault tolerance.

Solution: Topology refers to how nodes are physically or logically connected. Redundancy refers to the availability of multiple paths for data.

- **Mesh Topology:** In a "Full Mesh," every node has a direct point-to-point connection to **every other node** in the network. If there are n nodes, there are $\frac{n(n-1)}{2}$ connections.
- **Redundancy:** This provides the highest redundancy. If any single cable or node fails, there are always numerous other paths available to route the data, ensuring the network stays up.
- **Comparison:**
 - **Bus:** One cable break takes down the whole network.
 - **Star:** Central hub failure takes down everything.
 - **Ring:** Single node failure can disrupt the loop.

Final Answer : “Mesh”

Answer: (D)



Q37.

Solution

Concept: Automatic network configuration and IP management.

Solution: Devices on a network require an IP address to communicate. This can be done manually (Static IP) or automatically (Dynamic IP).

- **DHCP (Dynamic Host Configuration Protocol):** This protocol allows a central server to automatically assign an IP address, subnet mask, and default gateway to any device that joins the network. This prevents "IP conflicts" and simplifies network management.
- **Other Protocols:**
 - **FTP (File Transfer Protocol):** For moving files between systems.
 - **HTTP (Hypertext Transfer Protocol):** For transferring web pages.
 - **SMTP (Simple Mail Transfer Protocol):** For sending electronic mail.

Final Answer : "DHCP"

Answer: (C)

Q38.

Solution

Concept: Descriptive statistics and aggregation in Pandas.

Solution: The mean() function in Pandas is used to calculate the average of the values in a Series or DataFrame.

- (a) **Data Set:** We are given a Series containing the values: 5, 10, and 15.
- (b) **Step 1 - Summation:** Add all the numeric elements together. [$5 + 10 + 15 = 30$]
- (c) **Step 2 - Count:** Identify the total number of non-null elements in the Series. [Count = 3]
- (d) **Step 3 - Division:** Divide the total sum by the count. [$30 \div 3 = 10$]
- (d) **Output:** The arithmetic mean is exactly 10.

Final Answer : "10"

Answer: (B)



Q39.

Solution

Concept: Data cleaning, deduplication, and row management in Python Pandas.

Solution: In the process of data analysis, it is very common to encounter redundant or identical records within a dataset, often caused by data entry errors or merging multiple data sources. Pandas provides a robust method to handle this:

- (a) **Functionality:** The `drop_duplicates()` method identifies identical rows across all columns (or a subset of columns) and removes them.
- (b) **Immutability vs. Mutability:** By default, this method returns a new DataFrame with duplicates removed. To make the change **permanent** (modify the original object), the user must set the parameter `inplace=True`.
- (c) **Parameters:**
 - `subset`: Allows the user to specify specific columns to check for duplicates rather than the whole row.
 - `keep`: Determines which duplicate to retain—'first' (default), 'last', or False (remove all instances of duplicates).
- (d) **Other options:** Methods like `remove_duplicates()` or `delete_duplicates()` do not exist in the Pandas library; they are common naming misconceptions.

Final Answer : “`drop_duplicates()`”

Answer: (B)



Q40.

Solution

Concept: Structural properties and dimensionality of Pandas objects.

Solution: The `.ndim` attribute in Pandas is used to determine the number of dimensions of the underlying data structure.

- (a) **Definition:** In mathematics and computer science, dimensions refer to the axes of data. A single list or array is 1D, while a table is 2D.
- (b) **DataFrame Structure:** A Pandas DataFrame is defined as a two-dimensional, size-mutable, potentially heterogeneous tabular data structure. Because it consists of both an **Index (Rows)** and **Columns**, it is fundamentally a 2-axis structure.
- (c) **Fixed Value:** Regardless of whether the DataFrame contains zero rows, one row, or millions of rows, the attribute `df.ndim` will **always return 2** for a DataFrame.
- (d) **Comparison:** A Pandas Series, being a single column of data, will return 1 for the `ndim` attribute.

Final Answer : “2”

Answer: (C)

Q41.

Solution

Concept: File parsing and input customization in Pandas.

Solution: The `read_csv()` function is the most common way to load data into Pandas. While "CSV" stands for Comma-Separated Values, many text files use different characters (delimiters) to separate data fields, such as tabs (`\t`), semicolons (`;`), or pipes (`|`).

- **The 'sep' parameter:** This is the primary parameter used to define the delimiter. For a tab-separated file, one would use `sep='\t'`.
- **The 'delimiter' parameter:** This is a direct alias for `sep`. Both serve exactly the same purpose and are recognized by the function to allow flexibility in coding style.
- **Example:** `pd.read_csv('data.txt', sep=';')` tells Pandas that each column is separated by a semicolon rather than the default comma.

Parameters like `split` or `token` are functions in Python strings or NLP libraries, but they are not valid arguments for the `read_csv` method.

Final Answer : “delimiter / sep”

Answer: (B)



Q42.

Solution

Concept: Chaining attributes to retrieve metadata in NumPy format.

Solution: To understand `df.columns.values`, we must break down the attribute chain from left to right:

- (a) **df.columns:** This attribute accesses the columns of the DataFrame and returns an Index object (a specialized Pandas object) containing the names of all the column headers.
- (b) **.values:** When applied to a Pandas Index or Series, the `.values` attribute extracts the underlying data as a **NumPy n-dimensional array (ndarray)**.
- (c) **Combined Effect:** Chaining them together as `df.columns.values` converts the column labels into a raw array of strings or objects. This is frequently used when the user needs to perform array-based operations or pass the column names to another library that expects NumPy arrays instead of Pandas Index objects.

Final Answer : “NumPy array of column labels”

Answer: (B)

Q43.

Solution

Concept: Data sorting and ordering in Structured Query Language (SQL).

Solution: The `ORDER BY` clause is used in SQL to sort the result-set of a query.

- **Keywords:** To specify the direction of the sort, SQL uses `ASC` for Ascending (lowest to highest) and `DESC` for Descending (highest to lowest).
- **Logic:** In the requirement to display records in descending order of marks, the query must target the marks column and append the `DESC` keyword.
- **Correct Syntax:** `ORDER BY marks DESC`.
- **Common Errors:**
 - Using `SORT` instead of `ORDER BY` (SQL does not use the word `SORT` as a clause).
 - Putting the keyword before the column name (e.g., `ORDER DESC marks` is invalid).
 - Confusing it with `GROUP BY`, which is for aggregation, not simple row-wise sorting.

Final Answer : “ORDER BY marks DESC”

Answer: (A)



Q44.

Solution

Concept: Statistical aggregation using SQL aggregate functions.

Solution: SQL provides several aggregate functions to perform calculations across multiple rows of data:

- (a) **MIN(column):** Returns the smallest value in the specified column. It is the standard function for finding the minimum.
- (b) **Analysis of the query:** `SELECT MIN(salary) FROM employee;` is the syntactically correct way to ask the database to scan the `salary` column of the `employee` table and return only the lowest number found.
- (c) **Why others are wrong:**
 - `LOWEST()`, `SMALL()`, and `MINIMUM()` (full word) are not standard SQL aggregate functions.
 - `LEAST()` is a scalar function in some SQL dialects used to find the smallest value among several columns in a *single* row, not across all rows.

Final Answer : “`SELECT MIN(salary) FROM employee;`”

Answer: (B)

Q45.

Solution

Concept: Relational logic and preservation of data in Outer Joins.

Solution: When joining two tables (Left Table and Right Table), we must choose how to handle rows that do not have a corresponding match in the other table.

- **LEFT JOIN (or LEFT OUTER JOIN):** This join returns **all** records from the left table and the **matched** records from the right table.
- **Handling Unmatched Data:** If there is a row in the left table that has no match in the right table, the query still returns that row, but all columns coming from the right table will contain a `NULL` value.
- **Use Case:** This is used when the left table is the primary table (e.g., a list of all students) and the right table is optional information (e.g., extracurricular activities). It ensures no student is left out of the list just because they don't have an activity.

Final Answer : “LEFT JOIN”

Answer: (C)



Q46.

Solution

Concept: Visualization of coordinate data and correlation using Matplotlib.

Solution: A scatter plot is a type of plot that uses dots to represent values for two different numeric variables. It is the primary tool for identifying relationships (correlations) between variables.

- **plt.scatter():** This is the specific function in the `matplotlib.pyplot` module designed for scatter plots. Each pair of coordinates (x, y) (x,y) is plotted as an individual point on the grid.
- **plt.plot():** While `plt.plot()` can create dots if you specify markers (e.g., `plt.plot(x, y, 'o')`), it is primarily a line-plotting function.
- **Scatter vs. Line:** `plt.scatter()` provides much more control over individual point properties, such as setting the size (`s`) or color (`c`) of every dot based on a third variable.

Final Answer : “`plt.scatter()`”

Answer: (A)

Q47.

Solution

Concept: Automatic data labeling in Matplotlib Pie Charts.

Solution: When creating a pie chart to represent portions of a total, visual slices alone often lack precision. To show the exact numerical percentage each slice occupies, we use the `autopct` parameter.

- **Functionality:** The `autopct` (automatic percentage) parameter allows us to display the percent value using Python string formatting.
- **Syntax Example:** `plt.pie(data, autopct='%1.1f%%')` will calculate the percentage and display it as a decimal (e.g., 25.5%) on top of each slice.
- **Calculation:** The user does not need to calculate the percentage manually; Matplotlib sums all values and calculates the ratio of each slice automatically.

Arguments like `percent` or `showpct` are not recognized keywords in the Matplotlib `pie` function.

Final Answer : “`autopct`”

Answer: (C)



Q48.

Solution

Concept: Network security, availability threats, and resource exhaustion.

Solution: Most cyber attacks aim to steal data, but some aim to destroy the availability of a service.

- **DoS Attack:** Stands for Denial of Service. This attack works by sending a massive flood of traffic or requests to a targeted server or network.
- **Mechanism:** The server has a finite capacity for handling connections and processing power. When the attacker floods the system, legitimate users are "denied service" because the server is too overwhelmed to respond.
- **Distinction:** Unlike Phishing (stealing passwords) or Spoofing (faking identity), a DoS attack is a brute-force attempt to crash a website or network infrastructure.

Final Answer : "DoS Attack"

Answer: (B)

Q49.

Solution

Concept: Malicious software classification and surveillance technologies.

Solution: Different types of malware have different goals. Software designed specifically to spy on a user is called Spyware.

- **Definition:** Spyware is malicious software that installs itself on a device without the user's knowledge to gather sensitive information like browsing habits, personal messages, and credentials.
- **Keyloggers:** A common form of spyware is the Keylogger, which records every single key pressed by the user on their keyboard. This allows attackers to capture passwords and credit card numbers as they are typed.
- **Comparison:** Firewall and Antivirus are protective tools, while a Compiler is a legitimate programming tool.

Final Answer : "Spyware"

Answer: (C)



Q50.

Solution

Concept: Digital ethics, intellectual property law, and software licensing.

Solution: Ethical use of digital resources involves respecting the legal and intellectual property rights of creators.

- **Software Piracy:** This is the unauthorized use, duplication, or distribution of copyrighted software. Examples include downloading "cracked" versions of premium software or sharing a single-user license with multiple people.
- **Ethical concerns:** It deprives developers of their rightful earnings and often exposes users to security risks (malware hidden in cracked files).
- **Comparison:** Backups, Encryption, and using Licensed software are all considered "best practices" and ethical ways to handle digital technology.

Final Answer : "Software piracy"

Answer: (C)



Answer Key

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

