



Homework Paper: Advanced Database & Programming Fundamentals (40 Questions)

Instructions: Answer all 40 questions.

Part 1: MySQL (20 Questions)

Use the provided table structure and data for all SQL questions.

Table Structure and Data

Table: Products

Column Name	Data Type	Constraints	Description
ProductID	INT	PRIMARY KEY, NOT NULL, UNIQUE, AUTO_INCREMENT	Unique identifier for the product.
ProductName	VARCHAR(100)	NOT NULL, UNIQUE	Name of the product.
Category	VARCHAR(50)	NOT NULL	Product category (e.g., Electronics, Apparel).
Price	DECIMAL(10, 2)	NOT NULL	Price of the product.
StockQuantity	INT	NOT NULL	Current number of items in stock.

Current Data in Products Table:

ProductID	ProductName	Category	Price	StockQuantity
1001	Laptop Pro	Electronics	1200.00	15
1002	Cotton T-Shirt	Apparel	25.50	200
1003	Wireless Mouse	Electronics	30.00	50
1004	Denim Jeans	Apparel	75.99	80
1005	Smart Watch	Electronics	199.99	35
1006	Running Shoes	Apparel	90.00	120

ProductID	ProductName	Category	Price	StockQuantity
1007	4K Monitor	Electronics	450.00	10

A. Data Definition and Constraints (4 Questions)

1. Which constraint ensures that the ProductName column cannot contain duplicate values?
2. If you try to insert a new row without specifying a value for ProductID, what value will MySQL assign to it, and why?
3. Explain the difference between the **UNIQUE** constraint and the **PRIMARY KEY** constraint.
4. Write the full SQL statement to **create** the Products table structure exactly as defined above, including all constraints.

B. CRUD Operations (6 Questions)

5. Write the SQL statement to **insert** a new product: ProductName: 'Webcam HD', Category: 'Electronics', Price: 45.00, StockQuantity: 60.
6. Write the SQL statement to **update** the Price of the product named 'Cotton T-Shirt' to **30.00**.
7. Write the SQL statement to **delete** the product with ProductID **1007**.
8. Which of the four CRUD operations is performed by the SELECT command?
9. If you try to **insert** a product with a ProductName of 'Laptop Pro', what error will MySQL return, and why?
10. Write the SQL statement to **update** the StockQuantity for all products in the 'Apparel' category, increasing their stock by **10**.

C. SELECT with WHERE and DISTINCT (10 Questions)

11. Write the SQL statement to **retrieve** the ProductName and Price of all products that cost **more than 100.00**.
12. Write the SQL statement to **retrieve** all columns for products where the Category is **'Electronics'** AND the StockQuantity is **less than 20**.
13. Write the SQL statement to **retrieve** the ProductID and ProductName of products that are **not** in the 'Apparel' category.

14. Write the SQL statement to **retrieve** the **unique** list of Category values from the Products table.
 15. How many distinct Category values will the query from Q14 return based on the sample data?
 16. Write the SQL statement to **retrieve** the ProductName and StockQuantity for products where the Price is between **25.00** and **50.00** (inclusive).
 17. Write the SQL statement to **retrieve** all columns for products where the ProductName contains the word '**Mouse**'.
 18. Write the SQL statement to **retrieve** the names of products that have a StockQuantity of **120** OR a Price of **199.99**.
 19. Which keyword must be used in a SELECT statement to ensure that only non-duplicate values are returned for the specified column(s)?
 20. Write the SQL statement to **retrieve** a list of all **unique** Price values that are **greater than 50.00**.
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Part 2: Python (20 Questions)

*Note: All code examples and answers must use **TABS** for indentation.*

A. Control Flow (if-elif-else, match-case) (6 Questions)

21. Write a Python if-elif-else block to check a variable temp. If temp is above 30, print "Hot"; if it is between 20 and 30 (inclusive), print "Warm"; otherwise, print "Cold".
22. What is the output of the following code snippet?

```
Python
x = 10
y = 5
if x < 10 or y > 5:
    print("Condition 1")
elif x == 10 and y == 5:
    print("Condition 2")
else:
    print("Condition 3")
```

23. Rewrite the following if-elif-else block using the **match-case** statement. Assume color is a string variable.

Python

```
color = "red"
# Rewrite this using match-case
if color == "red":
    print("Stop")
elif color == "yellow":
    print("Caution")
else:
    print("Go")
```

24. In the match-case statement, what is the equivalent of the else block in an if-elif-else structure?
25. Write a short Python if statement to check if the length of the string name = "Gemini" is greater than 5.
26. When is the match-case statement generally preferred over the if-elif-else structure?

B. Loops (for, while) (6 Questions)

27. Write a Python **for** loop that iterates through the list numbers = [1, 5, 8] and prints the **square** of each number.
28. Write a Python **while** loop that starts a counter at 10 and prints the counter's value, decrementing it by 1 in each iteration, until the counter reaches 7 (i.e., print 10, 9, 8).
29. Which loop structure (specify for or while) is best suited for repeating a task an **unknown number of times**, where the stopping point depends on a specific condition being met?
30. What will be the final value of the variable total after the following code finishes?

Python

```
total = 0
for i in range(1, 4):
    total += i
```

31. Write a Python **for** loop that iterates through the string "Python" and prints each character.
32. Identify and fix the logical error in the following while loop that is intended to run indefinitely (an **infinite loop**):

Python

```
i = 1
while i > 0:
    print("Looping...")
```

C. Functions (8 Questions)

33. Write a Python function named `calculate_area` that accepts two arguments, width and height, and **returns** their product.
34. Write the function call (how you would run the function) for the function in Q33 using `width=5` and `height=10`, and store the result in a variable named `result`.
35. What is the role of the **return** keyword in a Python function?
36. Write a simple Python function named `greet` that takes one argument, name, and simply **prints** the message "Hello, " followed by the name.
37. Explain the concept of a **docstring** in a Python function.
38. When defining a function, if you do not specify a return statement, what value does the function implicitly return?
39. Write a Python function named `is_even` that takes an integer num as input and returns True if the number is even, and False otherwise.
40. How do you define a function in Python that accepts an **unlimited** number of positional arguments (using a special syntax)?