Week 1: Introduction & Foundational Skills (Focus on Project Relevance)

Part 1: Understanding SQL

Question 1. Research

1.1 Imagine a dynamic website like an online store. How do you think SQL plays a role in managing data behind the scenes? Consider how product information, user accounts, and order details might be stored and accessed.

In a dynamic website like an online store, SQL helps organize and manage important information behind the scenes. For products, SQL keeps track of details like names, prices, and availability, making it easy to update stock or find specific items. User accounts are stored with SQL too, storing things like usernames and passwords securely, so users can log in and manage their information. For orders, SQL connects everything together, keeping track of what users buy, when they buy it, and how they pay for it, making sure the store runs smoothly and customers get what they ordered.

1.2. Write a short explanation (3-5 sentences) in your document about the role of SQL in web applications.

Data Management: SQL (Structured Query Language) provides a standardized method for managing data in web applications, ensuring efficient storage, retrieval, and modification of information.

Data Integrity: SQL's ability to enforce constraints and relationships maintains data accuracy and consistency, crucial for reliable application operations.

Scalability: SQL databases support scalable growth by handling increasing volumes of data and user interactions, essential for web applications experiencing growth in traffic and content.

Functionality: SQL enables essential features in web applications, including user authentication, content management, transaction processing, and analytics, enhancing overall application functionality and performance.

1.3. List 3 benefits of using SQL for web applications.

1. **Data Accuracy**: SQL keeps information accurate by making sure each piece of data is correctly stored and linked together.
2. **Handling Lots of Data**: SQL can manage large amounts of information and many people using the website at once, which helps the website work smoothly as it gets more popular.
3. **Easy Data Retrieval**: SQL lets developers easily find and change specific bits of information in the database, making it simpler to create features like search bars and personalized user experiences on websites.

1.4. Think about efficiency, data organization, and data retrieval capabilities. Briefly explain each benefit in your document (1-2 sentences per benefit).

Efficiency: SQL helps websites work faster by quickly adding, changing, and finding information. This makes sure users don't have to wait long for pages to load.

Data Organization: SQL keeps things neat by storing different types of information in separate tables. This makes it easier to manage data, keep it accurate, and grow the website smoothly.

Data Retrieval Capabilities: SQL lets developers easily find specific information users need, like searching for products or showing personalized recommendations. It makes websites more useful and responsive to what users want.

1.5. List any 3 Database Management Systems.

a) Oracle Database

b) MySql

c) Postgre

Part 2: Database Fundamentals

Question 2.1: Tables

Think about how data is organized in rows and columns. In your document, define a database table and explain its similarity to a spreadsheet (2-3 sentences).

A database table is a structured collection of data organized into rows and columns, where each row represents a single record and each column represents a specific attribute or field of that record. Tables are used in relational database management systems (RDBMS) to store and manage data efficiently.

A database table is similar to a spreadsheet in that both organize data into rows (records) and columns (fields or attributes). Each cell in a spreadsheet corresponds to a specific intersection of row and column, similar to how data is stored in a database table. However, databases offer more robust features such as data integrity, transaction support, and scalability compared to spreadsheets, making them suitable for handling larger datasets and multi-user environments.

Question 2.2: Columns

Columns in a database table define the specific types of data that can be stored in each field. For example, in a `users` table, the `username` column might be defined as text to store user names, ensuring only textual data is entered.

Data types are important in databases because they define the kind of data that can be stored in each column, ensuring data integrity and accuracy. They also determine how the database system stores, retrieves, and processes the data.

Examples ;

Text (or String): Stores alphanumeric characters like names and descriptions. Example: (VARCHAR 255)for up to 255 characters.

Number : Stores numeric values such as integers (`INT`) or decimals (`DECIMAL(10, 2)` for 10 digits with 2 decimals).

Date and Time: Stores dates or both date and time (`DATETIME`, `TIMESTAMP`) for accurate time-related data.

Boolean (or Bool): Stores binary data representing true/false values (`BOOLEAN` or `BOOL`).

Question 2.3: Data Types

Data types ensure accurate and efficient storage in databases by specifying what kind of data can be stored in each column, ensuring data integrity and optimizing storage space.

1. **Text** :Stores names, addresses, or any text-based information.

   Ensures only text is stored, making searches and sorts faster and accurate.

2. **Number :**Stores integers or decimal values for precise calculations.

   Enables accurate mathematical operations and data handling.

3. **Date and Time**:Stores dates, times, or combined date-time values.

   Facilitates chronological sorting, filtering, and consistency in date-related data across applications.

Part 3: Expense Tracker Database Design

3.1. Planning: We'll be building an Expense Tracker application. What kind of data do you think we'll need to track? List at least 5 data points relevant to our project.

- Consider information like expense amount, date, and category.
- List your identified data points in your document.

five key data points that would be important to track in an Expense Tracker application:

1. **Expense Amount**: The amount of money spent for each expense entry.
2. **Date**: The date when the expense occurred.
3. **Category**: The category or type of expense (e.g., groceries, utilities, transportation).
4. **Description**: A brief description or note explaining the expense, providing context.
5. **Payment Method**: How the expense was paid (e.g., cash, credit card, debit card).

Expense table	
PK	Expense_id (INT)
	amount (DECIMAL)
	date (DATE)
	category (VARCHAR(255))
	description (VARCHAR(255))
	payment_method(VARCHAR(255))