**Part 1: Understanding SQL**

**Question 1.1: Research**

In the context of a dynamic website like an online store, SQL (Structured Query Language) plays a crucial role in managing data behind the scenes. It allows the site to store, retrieve, and manipulate data efficiently. For example, SQL is used to manage product information, user accounts, and order details. It ensures that when a user browses products, places an order, or updates their profile, the relevant data is accurately handled and stored in the database.

**Question 1.2: Role of SQL in Web Applications**

SQL is essential in web applications as it provides a standardized way to interact with the database. It enables the creation, reading, updating, and deletion (CRUD) of data, ensuring dynamic and responsive user experiences. SQL helps manage and query large amounts of data, ensuring that web applications can scale and perform efficiently.

**Question 1.3: Benefits of Using SQL for Web Applications**

1. **Efficiency**: SQL is optimized for handling large volumes of data and complex queries, making data retrieval and manipulation quick and efficient.
2. **Data Organization**: SQL databases provide a structured way to organize data into tables with relationships, ensuring data integrity and consistency.
3. **Scalability**: SQL databases can handle growing amounts of data and user requests, supporting the scalability of web applications.

**Question 1.4: Explanation of Benefits**

1. **Efficiency**: SQL's optimized query language allows for fast data retrieval and processing, crucial for dynamic web applications that need to provide quick responses to user actions.
2. **Data Organization**: SQL organizes data in a relational manner, using tables and relationships, which helps maintain data accuracy and reduces redundancy.
3. **Scalability**: SQL databases can manage increasing data loads and user demands, ensuring that the application remains performant as it grows.

**Question 1.5: Database Management Systems**

1. MySQL
2. PostgreSQL
3. SQLite

**Part 2: Database Fundamentals**

**Question 2.1: Tables**

A database table is a collection of related data organized in rows and columns. Each row represents a unique record, and each column represents a field within the record. This structure is similar to a spreadsheet, where data is organized in a grid, making it easy to read and manage.

**Question 2.2: Columns**

Columns in a database table represent the individual fields that hold data for each record. For example, in a table storing user information, columns could include 'user\_id', 'name', 'email', and 'date\_of\_birth'. Each column has a specific data type that defines the kind of data it can hold, ensuring consistency and integrity.

**Question 2.3: Data Types**

Data types are crucial in a database because they define the nature of the data that can be stored in each column, ensuring data integrity and efficient storage. Three common data types are:

1. **Text**: Stores alphanumeric characters, useful for names, addresses, and descriptions.
2. **Number**: Stores numerical values, essential for quantities, prices, and calculations.
3. **Date**: Stores date values, important for tracking events, deadlines, and timestamps.

**Part 3: Expense Tracker Database Design**

**3.1: Planning**

For an Expense Tracker application, we need to track the following data points:

1. Expense amount
2. Date of the expense
3. Category of the expense
4. Description of the expense
5. Payment method

**3.2: Tables**

The main table for the Expense Tracker application will be named "Expenses".

**Table Structure: Expenses**

| **Column Name** | **Data Type** |
| --- | --- |
| expense\_id | INT |
| amount | DECIMAL |
| date | DATE |
| category | TEXT |
| description | TEXT |
| payment\_method | TEXT |

**Bonus: Entity Relational Diagram (ERD)**

Expenses table structure:

