SQL Practice Assignment: TechNova Solutions

Role: Junior Database Administrator
Scenario: You are migrating data from Excel to PostgreSQL for a consulting firm.

Phase 1: The Setup (Schema Design)

Write the CREATE TABLE queries for the following structures:

Table: departments

Column Name	Data Type	Constraints
dept_id	SERIAL	Primary Key
dept_name	VARCHAR(50)	Not Null, Unique
location	VARCHAR(100)	-

Table: employees

Column Name	Data Type	Constraints
emp_id	SERIAL	Primary Key
first_name	VARCHAR(50)	Not Null
last_name	VARCHAR(50)	Not Null
email	VARCHAR(100)	Unique, Not Null
salary	DECIMAL(10, 2)	Check (salary > 0)
hire_date	DATE	Default CURRENT_DATE
dept_id	INTEGER	FK references departments(dept_id)

Table: projects

Column Name	Data Type	Constraints
project_id	SERIAL	Primary Key
project_name	VARCHAR(100)	Not Null
budget	DECIMAL(12, 2)	-

Table: works_on

Column Name	Data Type	Constraints
emp_id	INTEGER	FK ref employees, PK (Composite)
project_id	INTEGER	FK ref projects, PK (Composite)
hours_worked	INTEGER	-

Phase 2: Data Population

Write INSERT queries for the following data sets:

A. Departments:
1. 'HR', 'New York'
2. 'Engineering', 'San Francisco'
3. 'Marketing', 'Chicago'
4. 'Sales', 'New York'

B. Employees:
1. John Doe, john.doe@technova.com, 60000.00, 2022-01-15, (Engineering)
2. Jane Smith, jane.smith@technova.com, 85000.00, 2021-06-20, (Engineering)
3. Mike Brown, mike.brown@technova.com, 50000.00, 2023-03-10, (HR)
4. Sarah Connor, sarah.c@technova.com, 95000.00, 2020-11-05, (Marketing)
5. Alex Miller, alex.m@technova.com, 45000.00, 2023-08-01, (Sales)

C. Projects:
1. 'Website Redesign', 15000.00
2. 'Mobile App', 30000.00
3. 'Data Migration', 10000.00

D. Works_On:
1. John Doe -> Website Redesign (50 hours)
2. Jane Smith -> Mobile App (120 hours)
3. Jane Smith -> Website Redesign (20 hours)
4. Mike Brown -> Data Migration (15 hours)

Phase 3: The Assignment

Write the SQL queries for the following tasks.

Set A: Basics, Alterations & Deletion

1. Select the first_name, last_name, and salary of all employees.

2. Update the dept_name of the 'HR' department to 'Human Resources'.

3. Alex Miller has resigned. Delete his record from the employees table.

4. Alter the employees table to add a column phone_number (VARCHAR 15).

5. Update the budget for the 'Mobile App' project to 35000.00.

Set B: Filtering & Sorting

6. Find all employees who earn more than 65000.

7. Find all employees hired after January 1st, 2022.

8. Select all employees whose email ends with '@technova.com' (Use LIKE).

9. List all employees sorted by their salary in descending order.

10. Find the top 2 highest-paid employees (Use LIMIT).

Set C: Aggregation & Grouping

11. What is the total budget of all projects combined?

12. What is the average salary of all employees?

13. Count how many employees are in each department. (Result: dept_id, count).

14. Find the highest salary in the company.

15. Challenge: Calculate the total salary payout for each department.

Set D: Joins (The Real Test)

16. Inner Join: List all employee names along with their department names.

17. Left Join: List all departments and the employees within them (include empty depts).

18. Join with Aggregation: List Project Name and total hours worked on it.

19. Three-Table Join: List first_name, project_name, and hours_worked for all assignments.

20. Complex: Find employees who work in 'San Francisco' (Join employees & departments).