Ghulam Ishaq Khan Institute (GIKI)

Assignment # 2

Subject: Database Management System	**Course Code:** CS-232 Spring-25
Class: BS (SE,CySec) – **Batch:** 33 Fall - 2023	**Submission Deadline:** 25/04/2025-Fri (11:59-PM)
Instructor: Engr. Said Nabi, TA: TBD	**Total Marks: 140** (Marks are divided question wise)

Note (Read notes & instructions first)

- First of all, read the instructions and statements of each exercise/question carefully then write the solution.
- The name of your Zip file should contain your assignment number and your roll number as shown in following example, For Example if your roll number is 2023532 and you have done assignment number 1 then the name of file should be as ---> 2023532_1.pdf.
- This assignment is a learning opportunity that will be evaluated based on your ability. Plagiarism cases will be dealt with strictly. If found plagiarized, both the involved parties will be awarded zero marks in this assignment, all the remaining assignments, or even an F grade in the course.
- There will be viva for this assignment and the marks will be awarded for each correct question only upon successful completion.

CHEATING/COPY CASE or **LATE SUBMISSION** even 1 minute late will be graded as **STRAIGHT ZERO MARKS**.
So be on time make no excuse.

(Read Carefully)

Question:1   **Marks [140]**

Envision a scenario in which a compact, autonomously administered aviation facility necessitates the implementation of a comprehensive database system to facilitate the systematic management and oversight of critical operational entities. These entities encompass aircraft housed within the premises, their respective proprietors, personnel employed at the facility, and licensed pilots affiliated with its operations. Upon conducting an in-depth analysis of the functional and informational requisites of this system, the following core data elements and relationships were delineated:

1. Each **AIRPLANE** possesses a registration number **[Reg#]**, is associated with a specific plane type **[OF_TYPE]**, and is housed in a designated hangar **[STORED_IN]**.

Each **PLANE_TYPE** includes the following attributes: a model number **[Model]**, a capacity **[Capacity]**, and a weight **[Weight]**.

Each **HANGAR** is characterized by a unique number **[Number]**, a defined capacity **[Capacity]**, and a location **[Location]**.

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2. The database also records the **OWNERs** of each aircraft **[OWNS]**, as well as the **EMPLOYEEs** who have performed maintenance **[MAINTAIN]**. Each instance of the **OWNS** relationship connects an **AIRPLANE** to an **OWNER** and includes the **purchase date [Pdate]**. Each instance of the **MAINTAIN** relationship links an **EMPLOYEE** to a **SERVICE** record.

Since every aircraft undergoes maintenance on multiple occasions, it is connected via **[PLANE_SERVICE]** to several **SERVICE** records. A **SERVICE** record comprises the following attributes: the date of maintenance **[Date]**, the number of hours spent **[Hours]**, and the type of work performed **[Work_code]**.
Hint: Thoughtfully identify and justify the choice of entity types.

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3. An **OWNER** can either be a **person** or a **corporation**.
Hint: Carefully determine the appropriate category for [OWNER].

Both **PILOTs [PILOT]** and **EMPLOYEEs [EMPLOYEE]** are subclasses of the entity **PERSON**.

Each **PILOT** has distinct attributes, including a **license number [Lic_num]** and any applicable **restrictions [Restr]**.
Each **EMPLOYEE** is described by their **salary [Salary]** and the **shift** they are assigned to **[Shift]**.

All **PERSON** entities in the database maintain records for **Social Security number [Ssn]**, **name [Name]**, **address [Address]**, and **telephone number [Phone]**.

For CORPORATION entities, the data stored includes the name **[Name], address [Address], and telephone number [Phone].**

4. The database also tracks the types of airplanes each **PILOT** is authorized to fly **[FLIES]** and the types of planes each **EMPLOYEE** can maintain **[WORKS_ON]**.

Questions:

1. Draw a complete **ERD** diagram for the above-mentioned scenario. Remember to underline the keys and indicate the cardinalities.
Marks: 10

2. Create all necessary tables in **SQL** and insert at least 20 dummy records into each table.
Marks: 5

3. Write an **SQL** query to find the registration numbers of airplanes that have never undergone maintenance.
Marks: 5

4. Write an **SQL** query to find the names and addresses of corporations that own airplanes with a capacity greater than 200.
Marks: 5

5. Write an **SQL** query to find the average salary of employees who work the night shift (between 10 PM and 6 AM).
Marks: 5

6. Write an **SQL** query to find the top 5 employees with the highest total number of maintenance hours worked.
Marks: 5

7. Write an **SQL** query to find the names and registration numbers of airplanes that have undergone maintenance in the past week.
Marks: 5

8. Write an **SQL** query to find the names and phone numbers of all owners who have purchased a plane in the past month.
Marks: 5

9. Write an **SQL** query to find the number of airplanes each pilot is authorized to fly.
Marks: 5

10. Write an **SQL** query to find the location and capacity of the hangar with the most available space.
Marks: 5

11. Write an **SQL** query to find the number of planes owned by each corporation, sorted in descending order by number of planes.
Marks: 5

12. Write an **SQL** query to find the average number of maintenance hours per plane, broken down by plane type.
Marks: 5

13. Write an **SQL** query to find the names of owners who have purchased a plane that requires maintenance work from an employee who is not qualified to work on that type of plane.
Marks: 5

14. Write an **SQL** query to find the names and phone numbers of owners who have purchased a plane from a corporation that has a hangar in the same location as the owner.
Marks: 10

15. Write an **SQL** query to find the names of pilots who are qualified to fly a plane that is currently undergoing maintenance.
Marks: 5

16. Write an **SQL** query to find the names of employees who have worked on planes owned by a particular corporation, sorted by the total number of maintenance hours worked.
Marks: 5

17. Write an **SQL** query to find the names and registration numbers of airplanes that have never been owned by a corporation or undergone maintenance work from an employee who works the day shift.
Marks: 5

18. Write an **SQL** query to find the names and addresses of owners who have purchased a plane from a corporation that has also purchased a plane of the same type in the past month.
Marks: 5

19. Write a query to find the total number of planes stored in each hangar.
Marks: 5

20. Write a query to find the total number of planes of each plane type.
Marks: 5

21. Write a query to find the total number of services performed on each plane.
Marks: 5

22. Write a query to find the average salary of employees in each shift.
Marks: 5

23. Write a query to find the total number of planes each owner owns.
Marks: 5

24. Write a query to find the number of planes each pilot is authorized to fly.
Marks: 5

25. Write 4 additional queries and explain their importance in the comments. Mention where and why these queries would be useful.
Marks: 10

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