Rajshahi University of Engineering & Technology, Rajshahi

Department of Electrical & Computer Engineering

Course Title   : Data Base Systems Sessional

Course Code   : ECE 2216

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Submitted to:

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Experiment No: 02

Experiment Name:

Students Table

student_id	student_name	age	GPA	department	year_of_admission	fees_paid	credits_earned	enrollment_status
1	Eleven	21	3.8	Engineering	2021	10000	120	active
2	Dustin	22	3.9	Science	2020	9000	110	active
3	Will	19	3.4	Business	2022	8500	95	active
4	Mike	23	3.7	Science	2021	9500	115	inactive
5	Max	20	3.5	Engineering	2020	12000	130	active
6	Eddie	22	4.0	Arts	2019	8000	140	active
7	Billy	24	2.9	Engineering	2022	5000	60	active
8	Alexei	25	3.2	Business	2018	7500	100	inactive
9	Steve	21	3.8	Science	2021	10500	120	active
10	Robin	20	3.6	Engineering	2022	11000	125	active
11	Lucas	18	2.7	Engineering	2023	4000	50	active
12	Nancy	23	3.9	Business	2019	9500	135	active

Task:

1. Find students who are older than 20 and have a GPA above the average GPA of all students

2. Find the top 5 students with the highest fees paid, ordered by GPA (in descending order) as a tiebreaker

3. List students who belong to the "Engineering" department, have a GPA greater than 3.5, and are enrolled after 2020

4. Find students who are not active (i.e., enrollment_status = 'inactive') and have not paid any fees (fees_paid = 0)

5. Calculate the total fees paid and average GPA for each department, but only for departments with more than 10 students

Theory: Structured Query Language (SQL) is a versatile and standardized programming language used for managing and interacting with relational databases. It enables users to perform a range of operations, such as querying, updating, inserting, and deleting data within a database. SQL offers a comprehensive framework for retrieving specific data using commands like SELECT, INSERT, UPDATE, and DELETE. A relational database stores data in tables, which are made up of rows and columns. Each table corresponds to a particular entity, with rows representing individual records and columns denoting specific attributes of that entity. Relationships between tables can be established using foreign keys, allowing for complex data interactions and ensuring data integrity. SQL also provides various functions for filtering and organizing data. The WHERE clause can be used to set conditions, the ORDER BY clause helps sort results, and aggregate functions like SUM, AVG, and COUNT allow for effective data summarization and analysis.
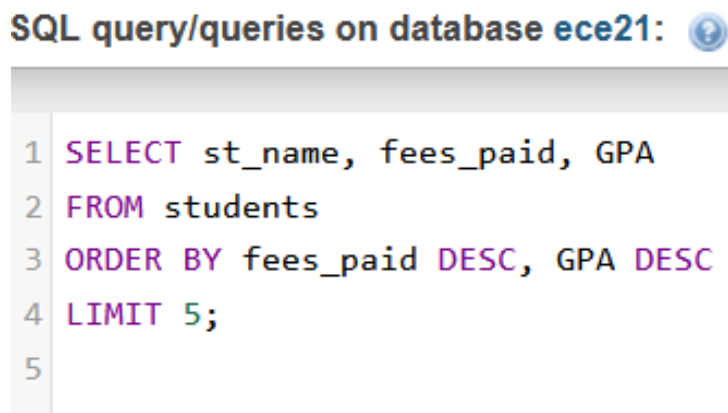
Tools:

1. Computer
2. MySQL
3. Internet
4. Reference Book

Query and Output:

Task-01:

Query:


```
SQL query/queries on database ece21:

1 SELECT st_name, fees_paid, GPA
2 FROM students
3 ORDER BY fees_paid DESC, GPA DESC
4 LIMIT 5;
5
```

Fig. no. 1: Code for find students who are older than 20 and have a GPA above the average GPA of all students.

Output:

Fig. no. 2: Output of students who are older than 20 and have a GPA above the average GPA of all students

Task-02:

Query:


```sql
1 SELECT st_name, fees_paid, GPA
2 FROM Students
3 ORDER BY fees_paid DESC, GPA DESC
4 LIMIT 5;
5
```

Fig. no. 3: Code to find top 5 students with the highest fees paid, ordered by GPA (in descending order) as a tiebreaker

Output:

st_name	fees_paid ▾ 1	GPA ▾ 2
Max	12000.00	3.50
Robin	11000.00	3.60
Steve	10500.00	3.80
Eleven	10000.00	3.80
Nancy	9500.00	3.90

Fig. no. 4: Output of top 5 students with the highest fees paid, ordered by GPA (in descending order) as a tiebreaker

Task-03:

Query:

SQL query/queries on table ece21.Students: ⓘ

```sql
1 SELECT st_name, department, GPA, year
2 FROM Students
3 WHERE department = 'Engineering'
4 AND GPA > 3.5
5 AND year > 2020;
6
```

Fig. no. 5: Code to find students who belong to the "Engineering" department, have a GPA greater than 3.5, and are enrolled after 2020.

Output:

department	GPA	year
Engineering	3.80	2021
Engineering	3.60	2022

Fig. no. 6: Output of finding students who belong to the "Engineering" department, have a GPA greater than 3.5, and are enrolled after 2020.

Task-04:

Query:

```
SQL query/queries on table ece21.Students:

1  SELECT st_name, enrollment_status, fees_paid
2  FROM Students
3  WHERE enrollment_status = 'inactive'
4  AND fees_paid = 0;
5  |
```

Fig. no. 7: Code to Find students who are not active (i.e., enrollment_status = 'inactive') and have not paid any fees (fees_paid = 0)

Output:

st_name	enrollment_status	fees_paid

Fig. no. 8: Output of finding students who are not active (i.e., enrollment_status = 'inactive') and have not paid any fees (fees_paid = 0).(Blank)

Task-05:

Query:

```sql
1  SELECT department,  SUM(fees_paid) AS total_fees,  AVG(GPA)
2  AS avg_GPA
3  FROM students
4  GROUP BY department
5  HAVING COUNT(st_id) > 10;
```

Fig. no. 9: Code to calculate the total fees paid and average GPA for each department, but only for departments with more than 10 students

Output:

department	total_fees	avg_GPA

Fig. no. 9: Output to calculate the total fees paid and average GPA for each department, but only for departments with more than 10 students. (Blank)

Discussion: SQL, or Structured Query Language, is a standardized programming language designed for managing and interacting with relational databases by enabling users to perform a variety of operations, such as querying, updating, inserting, and deleting data, all within a structured framework that includes commands like SELECT, INSERT, UPDATE, and DELETE; relational databases organize data into tables consisting of rows and columns, where each table represents an entity, rows correspond to individual records, and columns define specific attributes, while relationships between tables can be established through foreign keys to facilitate complex interactions and maintain data integrity, and SQL offers robust functionality for filtering, sorting, and summarizing data using tools like the WHERE clause for conditions, ORDER BY for sorting, and aggregate functions such as SUM, AVG, and COUNT for efficient data analysis.