Student Information System (SIS)

Task 1. Database Design

1. Create the database named "SISDB"

```
create database SISDB
```

2. Define the schema for the Students, Courses, Enrollments, Teacher, and Payments tables based on the provided schema. Write SQL scripts to create the mentioned tables with appropriate data

types, constraints, and relationships.

a. Students

b. Courses

c. Enrollments

d. Teacher

e. Payments

```
CREATE TABLE Students (
    student_id INT PRIMARY KEY IDENTITY(1,1),
    first_name VARCHAR(50),
    last_name VARCHAR(50),
    date_of_birth DATE,
    email VARCHAR(100) UNIQUE,
    phone_number VARCHAR(15)
);

CREATE TABLE Courses (
    course_id INT PRIMARY KEY IDENTITY(1,1),
    course_name VARCHAR(100),
    credits INT CHECK (credits > 0),
    teacher_id INT,
    FOREIGN KEY (teacher_id) REFERENCES Teacher(teacher_id)
```

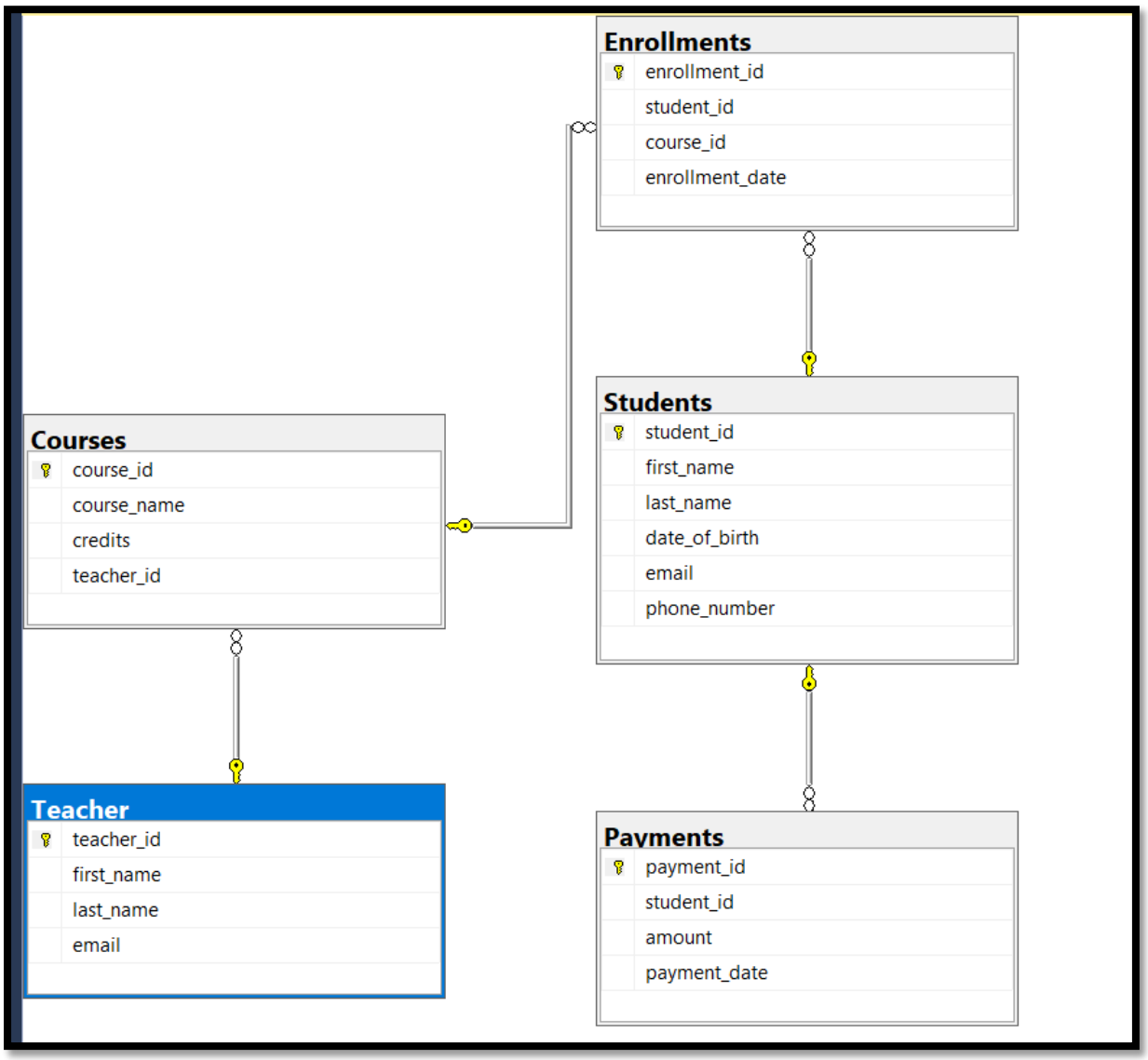
```
);

CREATE TABLE Enrollments (
    enrollment_id INT PRIMARY KEY IDENTITY(1,1),
    student_id INT,
    course_id INT,
    enrollment_date DATE DEFAULT GETDATE(),
    FOREIGN KEY (student_id) REFERENCES Students(student_id),
    FOREIGN KEY (course_id) REFERENCES Courses(course_id)
);

CREATE TABLE Teacher (
    teacher_id INT PRIMARY KEY IDENTITY(1,1),
    first_name VARCHAR(50),
    last_name VARCHAR(50),
    email VARCHAR(100) UNIQUE
);

CREATE TABLE Payments (
    payment_id INT PRIMARY KEY IDENTITY(1,1),
    student_id INT NOT NULL,
    amount DECIMAL(10, 2) NOT NULL,
    payment_date DATE NOT NULL,
    FOREIGN KEY (student_id) REFERENCES Students(student_id)
);
```

3. Create an ERD (Entity Relationship Diagram) for the database.



4. Create appropriate Primary Key and Foreign Key constraints for referential integrity.

5. Insert at least 10 sample records into each of the following tables.

i. Students

ii. Courses

iii.Enrollments

iv. Teacher

v. Payments

```
INSERT INTO Students (first_name, last_name, date_of_birth, email, phone_number)
VALUES
('Amit', 'Sharma', '2000-01-10', 'amit.sharma@example.com', '9876543210'),
('Sneha', 'Patil', '1999-05-15', 'sneha.patil@example.com', '9876543211'),
('Raj', 'Mehta', '2001-02-20', 'raj.mehta@example.com', '9876543212'),
('Anjali', 'Kumar', '1998-07-25', 'anjali.kumar@example.com', '9876543213'),
('Karan', 'Joshi', '2000-12-30', 'karan.joshi@example.com', '9876543214'),
('Neha', 'Deshmukh', '2002-04-10', 'neha.deshmukh@example.com', '9876543215'),
('Ravi', 'Yadav', '2001-06-18', 'ravi.yadav@example.com', '9876543216'),
('Pooja', 'Nair', '1999-09-09', 'pooja.nair@example.com', '9876543217'),
('Arjun', 'Rao', '2000-11-11', 'arjun.rao@example.com', '9876543218'),
('Divya', 'Iyer', '2001-03-03', 'divya.iyer@example.com', '9876543219');
```

```
INSERT INTO Courses (course_name, credits, teacher_id) VALUES
('Data Structures', 3, 1),
('Operating Systems', 4, 2),
('Database Management', 3, 3),
('Computer Networks', 4, 4),
('Machine Learning', 3, 5),
('Web Development', 2, 1),
('Software Engineering', 3, 2),
('AI Fundamentals', 3, 3),
('Cloud Computing', 3, 4),
```

```
('Cybersecurity', 3, 5);

INSERT INTO Enrollments (student_id, course_id) VALUES
(1, 1),
(2, 2),
(3, 3),
(4, 4),
(5, 5),
(6, 6),
(7, 7),
(8, 8),
(9, 9),
(10, 10);

INSERT INTO Teacher (first_name, last_name, email) VALUES
('Suresh', 'Pillai', 'suresh.pillai@college.edu'),
('Meena', 'Bhat', 'meena.bhat@college.edu'),
('Rahul', 'Khanna', 'rahul.khanna@college.edu'),
('Geeta', 'Singh', 'geeta.singh@college.edu'),
('Anil', 'Verma', 'anil.verma@college.edu');

INSERT INTO Payments (student_id, amount, payment_date) VALUES
(1, 5000.00, '2025-01-15'),
(2, 5200.00, '2025-01-18'),
(3, 4800.00, '2025-02-01'),
(4, 5300.00, '2025-02-12'),
(5, 5000.00, '2025-03-05'),
(6, 5100.00, '2025-03-20'),
(7, 4950.00, '2025-04-10'),
(8, 5050.00, '2025-04-18'),
```

```
(9, 5000.00, '2025-05-02'),
(10, 4900.00, '2025-05-15');

INSERT INTO Payments (student_id, amount) VALUES
(1, 5000.00),
(2, 5200.00),
(3, 4800.00),
(4, 5300.00),
(5, 5000.00),
(6, 5100.00),
(7, 4950.00),
(8, 5050.00),
(9, 5000.00),
(10, 4900.00);

INSERT INTO Payments (student_id, amount) VALUES
(1, 5000.00),
(2, 5200.00),
(3, 4800.00),
(4, 5300.00),
(5, 5000.00),
(6, 5100.00),
(7, 4950.00),
(8, 5050.00),
(9, 5000.00),
(10, 4900.00);
```

Task 2

1. Write an SQL query to insert a new student into the "Students" table with the following details:

a. First Name: John

b. Last Name: Doe

c. Date of Birth: 1995-08-15

d. Email: john.doe@example.com

e. Phone Number: 1234567890

```
insert into Students (first_name, last_name, date_of_birth, email, phone_number) VALUES
( 'John', 'Doe', '1995-08-15', 'john.doe@example.com', 1234567890);
```

2. Write an SQL query to enroll a student in a course. Choose an existing student and course and insert a record into the "Enrollments" table with the enrollment date.

```
insert into enrollments (student_id, course_id, enrollment_date)
values (3, 2, '2025-06-13');
```

3.Update the email address of a specific teacher in the "Teacher" table. Choose any teacher and modify their email address.

```
Update Teacher set email = 'anil.verma2@college.edu' where teacher_id = 5;
```

4. Write an SQL query to delete a specific enrollment record from the "Enrollments" table. Select an enrollment record based on the student and course.

```
Delete from Enrollments where enrollment_id = 10
```

5. Update the "Courses" table to assign a specific teacher to a course. Choose any course and teacher from the respective tables.

```
Update Courses set teacher_id = 4 where course_id = 10
```

6. Delete a specific student from the "Students" table and remove all their enrollment records from the "Enrollments" table. Be sure to maintain referential integrity

```
delete from payments
where student_id = 5;

delete from enrollments
where student_id = 5;

delete from students
where student_id = 5;
```

7. Update the payment amount for a specific payment record in the "Payments" table. Choose any payment record and modify the payment amount.

```
update payments set amount = 5500.00 where payment_id = 4;
```

Task 3

1. Write an SQL query to calculate the total payments made by a specific student. You will need to join the "Payments" table with the "Students" table based on the student's ID

```
select s.first_name, s.last_name, sum(p.amount) as total_payment
from payments p join students s on p.student_id = s.student_id
where s.student_id = 3
group by s.first_name, s.last_name;
```

2. Write an SQL query to retrieve a list of courses along with the count of students enrolled in each course. Use a JOIN operation between the "Courses" table and the "Enrollments" table.

```
select c.course_name, count(student_id) as 'Total_enrolled' from courses c join enrollments e on c.course_id = e.course_id group by c.course_name
```

3. Write an SQL query to find the names of students who have not enrolled in any course. Use a LEFT JOIN between the "Students" table and the "Enrollments" table to identify students without enrollments.

```
select s.first_name, s.last_name from students s left join enrollments e on s.student_id != e.student_id where e.enrollment_id is null
```

4. Write an SQL query to retrieve the first name, last name of students, and the names of the courses they are enrolled in. Use JOIN operations between the "Students" table and the "Enrollments" and "Courses" tables.

```
select s.first_name, s.last_name, c.course_name from students s
join enrollments e on s.student_id = e.student_id
join courses c on e.course_id = c.course_id
```

5. Create a query to list the names of teachers and the courses they are assigned to. Join the "Teacher" table with the "Courses" table.

```
select t.first_name, t.last_name, c.course_name from teacher t join courses c on t.teacher_id = c.teacher_id;
```

6. Retrieve a list of students and their enrollment dates for a specific course. You'll need to join the "Students" table with the "Enrollments" and "Courses" tables.

```
select s.first_name, s.last_name, e.enrollment_date
from students s
join enrollments e on s.student_id = e.student_id
join courses c on e.course_id = c.course_id
where c.course_name = 'data structures';
```

7. Find the names of students who have not made any payments. Use a LEFT JOIN between the "Students" table and the "Payments" table and filter for students with NULL payment records.

```
select s.first_name, s.last_name
from students s
left join payments p on s.student_id = p.student_id
where p.payment_id is null;
```

8. Write a query to identify courses that have no enrollments. You'll need to use a LEFT JOIN between the "Courses" table and the "Enrollments" table and filter for courses with NULL enrollment records.

```
select c.course_name
from courses c
left join enrollments e on c.course_id = e.course_id
where e.enrollment_id is null;
```

9. Identify students who are enrolled in more than one course. Use a self-join on the "Enrollments" table to find students with multiple enrollment records.

```
select distinct s.first_name, s.last_name
from enrollments e1
join enrollments e2 on e1.student_id = e2.student_id and e1.course_id <> e2.course_id
join students s on e1.student_id = s.student_id;
```

10. Find teachers who are not assigned to any courses. Use a LEFT JOIN between the "Teacher" table and the "Courses" table and filter for teachers with NULL course assignments.

```
select t.first_name, t.last_name
from teacher t
left join courses c on t.teacher_id = c.teacher_id
where c.course_id is null;
```

Task 4

1. Write an SQL query to calculate the average number of students enrolled in each course. Use aggregate functions and subqueries to achieve this.

```
select avg(student_count) as average_enrollments_per_course
from (
    select count(e.student_id) as student_count
    from enrollments e
    group by e.course_id
) as course_enrollments;
```

2. Identify the student(s) who made the highest payment. Use a subquery to find the maximum payment amount and then retrieve the student(s) associated with that amount.

```
select s.first_name, s.last_name, p.amount
from payments p
join students s on p.student_id = s.student_id
where p.amount = (
    select max(amount)
    from payments
);
```

3. Retrieve a list of courses with the highest number of enrollments. Use subqueries to find the course(s) with the maximum enrollment count.

```
select c.course_name, count(e.enrollment_id) as total_enrollments
from courses c
join enrollments e on c.course_id = e.course_id
group by c.course_id, c.course_name
having count(e.enrollment_id) = (
```

```
    select max(enrollment_count)
    from (
        select count(enrollment_id) as enrollment_count
        from enrollments
        group by course_id
    ) as course_counts
);
```

4. Calculate the total payments made to courses taught by each teacher. Use subqueries to sum payments for each teacher's courses.

```
select t.first_name, t.last_name, (
    select sum(p.amount)
    from payments p
    join enrollments e on p.student_id = e.student_id
    join courses c2 on e.course_id = c2.course_id
    where c2.teacher_id = t.teacher_id
) as total_payments
from teacher t;
```

5. Identify students who are enrolled in all available courses. Use subqueries to compare a student's enrollments with the total number of courses.

```
select s.first_name, s.last_name
from students s
join enrollments e on s.student_id = e.student_id
group by s.student_id, s.first_name, s.last_name
having count(distinct e.course_id) = (
    select count(*) from courses
);
```

6. Retrieve the names of teachers who have not been assigned to any courses. Use subqueries to find teachers with no course assignments.

```
select first_name, last_name
from teacher
where teacher_id not in (
    select distinct teacher_id
    from courses
    where teacher_id is not null
);
```

7. Calculate the average age of all students. Use subqueries to calculate the age of each student based on their date of birth.

```
select avg(age) as average_age
from (
    select datediff(year, date_of_birth, getdate()) as age
    from students
) as student_ages;
```

8. Identify courses with no enrollments. Use subqueries to find courses without enrollment records.

```
select course_name
from courses
where course_id not in (
    select distinct course_id
    from enrollments
);
```

9. Calculate the total payments made by each student for each course they are enrolled in. Use subqueries and aggregate functions to sum payments

```
select s.first_name, s.last_name, c.course_name, (
    select sum(p.amount)
    from payments p
    where p.student_id = s.student_id
) as total_payment
from students s
join enrollments e on s.student_id = e.student_id
join courses c on e.course_id = c.course_id
group by s.first_name, s.last_name, c.course_name, s.student_id;
```

10. Identify students who have made more than one payment. Use subqueries and aggregate functions to count payments per student and filter for those with counts greater than one.

```
select s.first_name, s.last_name
from students s
where s.student_id in (
    select student_id
    from payments
    group by student_id
    having count(payment_id) > 1
);
```

11. Write an SQL query to calculate the total payments made by each student. Join the "Students" table with the "Payments" table and use GROUP BY to calculate the sum of payments for each student.

```
select s.first_name, s.last_name, sum(p.amount) as total_payment
from students s
join payments p on s.student_id = p.student_id
group by s.first_name, s.last_name;
```

12. Retrieve a list of course names along with the count of students enrolled in each course. Use JOIN operations between the "Courses" table and the "Enrollments" table and GROUP BY to count enrollments.

```
select c.course_name, count(e.student_id) as total_enrolled
from courses c
join enrollments e on c.course_id = e.course_id
group by c.course_name;
```

13. Calculate the average payment amount made by students. Use JOIN operations between the "Students" table and the "Payments" table and GROUP BY to calculate the average.

```
select s.first_name, s.last_name, avg(p.amount) as average_payment
from students s
join payments p on s.student_id = p.student_id
group by s.first_name, s.last_name;
```