Primary Key and Foreign Key in DBMS

1. Primary Key
A Primary Key is a column (or set of columns) in a table that uniquely identifies each row in that table.

Rules for Primary Key:

- • Each table can have only one primary key.
- • Primary key values must be unique.
- • Primary key values cannot be NULL.

Example:

```
CREATE TABLE Students (
    StudentID INT PRIMARY KEY,
    Name VARCHAR(50),
    Course VARCHAR(30)
);
```

2. Foreign Key
A Foreign Key is a column (or set of columns) that establishes a link between the data in two tables. It refers to the Primary Key in another table.

Example:

```
CREATE TABLE Enrollments (
    EnrollmentID INT PRIMARY KEY,
    StudentID INT,
    FOREIGN KEY (StudentID) REFERENCES Students(StudentID)
);
```

3. What You Should NOT Do While Using a Foreign Key

- • Do not reference a column that is not a Primary Key or Unique Key.
- • Do not insert a value in the foreign key column that does not exist in the parent table.
- • Do not delete a record from the parent table if related records exist in the child table (unless cascading is enabled).
- • Do not use mismatched data types between the foreign key and the referenced primary key.

College Database Example (Student - Department - Course)

1. Department Table

```
CREATE TABLE Department (
    DeptID INT PRIMARY KEY,
    DeptName VARCHAR(50),
    HODName VARCHAR(50)
);
```

Explanation: DeptID is the Primary Key which uniquely identifies each department.

2. Course Table

```sql
CREATE TABLE Course (
    CourseID INT PRIMARY KEY,
    CourseName VARCHAR(50),
    DeptID INT,
    FOREIGN KEY (DeptID) REFERENCES Department(DeptID)
);
```

Explanation: DeptID is a Foreign Key linking each course to a department.

3. Student Table

```sql
CREATE TABLE Student (
    StudentID INT PRIMARY KEY,
    StudentName VARCHAR(50),
    DeptID INT,
    CourseID INT,
    FOREIGN KEY (DeptID) REFERENCES Department(DeptID),
    FOREIGN KEY (CourseID) REFERENCES Course(CourseID)
);
```

Explanation: StudentID is the Primary Key, and DeptID and CourseID are Foreign Keys linking the student to department and course.

Sample Program

```
INSERT INTO Department VALUES (1, 'Computer Science', 'Dr. Meena');
INSERT INTO Department VALUES (2, 'Information Technology', 'Dr. Kumar');
INSERT INTO Department VALUES (3, 'Electronics', 'Dr. Radha');

INSERT INTO Course VALUES (101, 'DBMS', 1);
INSERT INTO Course VALUES (102, 'Data Structures', 1);
INSERT INTO Course VALUES (103, 'Networks', 2);
INSERT INTO Course VALUES (104, 'Microprocessors', 3);

INSERT INTO Student VALUES (1001, 'Ravi', 1, 101);
INSERT INTO Student VALUES (1002, 'Priya', 1, 102);
INSERT INTO Student VALUES (1003, 'Karan', 2, 103);
```