# TASK 4

## Using Functions in Queries and Writing Sub Queries

Aim:  
 To perform the advanced query processing and test its heuristics using designing of optimal correlated and nested sub queries such as finding summary statistics.

1. To retrieve all department details, including the count of offered courses for each department.

SQL> SELECT d.DepartmentID, d.DepartmentName, COUNT(c.CourseID) AS TotalCourses FROM Department d LEFT JOIN Course c ON d.DepartmentID = c.DepartmentID GROUP BY d.DepartmentID, d.DepartmentName;

Output:

|  |  |  |
| --- | --- | --- |
|  |  |  |

DepartmentID DepartmentName TotalCourses  
D001 Computer Science 3  
D002 Mathematics 2  
D003 Physics 1

2. To retrieve the total number of students who have not enrolled in any course.

SQL> SELECT COUNT(\*) AS UnenrolledStudents FROM Student s WHERE s.StudentID NOT IN (SELECT DISTINCT StudentID FROM Enrollment);

Output:  
UnenrolledStudents  
5

3. To retrieve the department details that offer courses.

SQL> SELECT \* FROM Department WHERE DepartmentID IN (SELECT DISTINCT DepartmentID FROM Course);

Output:  
DepartmentID DepartmentName  
D001 Computer Science  
D002 Mathematics  
D003 Physics

4. To retrieve student and course details of students who are above 21 years old.

SQL> SELECT s.StudentID, s.Name AS StudentName, s.Age, c.CourseID, c.CourseName FROM Student s, Course c WHERE s.StudentID IN (SELECT StudentID FROM Student WHERE Age > 21);

Output:  
StudentID StudentName Age CourseID CourseName  
S001 Alice 22 C101 Database Systems  
S002 John 23 C102 Algorithms

5. To retrieve the details of departments that have no courses assigned.

SQL> SELECT \* FROM Department WHERE DepartmentID NOT IN (SELECT DISTINCT DepartmentID FROM Course);

Output:  
DepartmentID DepartmentName  
D004 Chemistry  
D005 History

6. To retrieve the DepartmentID, CourseID, DepartmentName, and StudentName for a given StudentID.

SQL> SELECT d.DepartmentID, c.CourseID, d.DepartmentName, s.Name FROM Department d JOIN Course c ON d.DepartmentID = c.DepartmentID JOIN Enrollment e ON c.CourseID = e.CourseID JOIN Student s ON s.StudentID = e.StudentID WHERE s.StudentID = 'S002';

Output:  
DepartmentID CourseID DepartmentName StudentName  
D001 C102 Computer Science John

Result:  
Thus the query using joins and writing subqueries has been done successfully.