Name: T.Tayyab
Regd.no: Y21CS172

WEEK 3:

Write SQL Select Statements for the following simple queries that retrieve data from a single table:

1. Find the details of all students.

SQL> select * from student;

```
ID    NAME                 DEPT_NAME             TOT_CRED
----- -------------------- -------------------- ----------
00128 Zhang                Comp. Sci.                 102
12345 Shankar              Comp. Sci.                  32
19991 Brandt               History                     80
23121 Chavez               Finance                    110
44553 Peltier              Physics                     56
45678 Levy                 Physics                     46
54321 Williams             Comp. Sci.                  54
55739 Sanchez              Music                       38
70557 Snow                 Physics                      0
76543 Brown                Comp. Sci.                  58
76653 Aoi                  Elec. Eng.                  60

ID    NAME                 DEPT_NAME             TOT_CRED
----- -------------------- -------------------- ----------
98765 Bourikas             Elec. Eng.                  98
98988 Tanaka               Biology                    120

13 rows selected.
```

2. Find the department names of instructors.

SQL> select name, dept_name from instructor;

```
NAME                 DEPT_NAME
-------------------- --------------------
Srinivasan           Comp. Sci.
Wu                   Finance
Mozart               Music
Einstein             Physics
El Said              History
Gold                 Physics
Katz                 Comp. Sci.
Califieri            History
Singh                Finance
Crick                Biology
Brandt               Comp. Sci.

NAME                 DEPT_NAME
-------------------- --------------------
Kim                  Elec. Eng.

12 rows selected.
```

3. Find the names of all the instructors from Biology department.

SQL> select name from instructor where dept_name like 'Biology';

```
NAME
--------------------
Crick
```

4. Find the names of all instructors in the Computer Science department who have salaries greater than $70000.

SQL> select name, salary from instructor where dept_name like 'Comp. Sci.' and salary > 70000;

```
NAME                      SALARY
-------------------- ----------
Katz                       75000
Brandt                     92000
```

5. Find the names of courses in Computer science department which have 3 credits

SQL> select title from course where dept_name like 'Comp. Sci.' and credits like 3;

```
TITLE
-----------------------------
Robotics
Image Processing
Database System Concepts
```

6. Find the names of the instructors, their present salaries and the resulting salaries if they were given a 10% raise.

SQL> select name, salary, (salary*1.1) as "Raised Salary" from instructor;

```
NAME                      SALARY Raised Salary
-------------------- ---------- -------------
Srinivasan                 65000         71500
Wu                         90000         99000
Mozart                     40000         44000
Einstein                   95000        104500
El Said                    60000         66000
Gold                       87000         95700
Katz                       75000         82500
Califieri                  62000         68200
Singh                      80000         88000
Crick                      72000         79200
Brandt                     92000        101200

NAME                      SALARY Raised Salary
-------------------- ---------- -------------
Kim                        80000         88000

12 rows selected.
```

7. Find the names of instructors with salary amounts between $90000 and $100000.

SQL> select name, salary from instructor where salary between 90000 and 100000;

NAME	SALARY
Wu	90000
Einstein	95000
Brandt	92000

8. Find all instructors whose salary is unknown.

SQL> select * from instructor where salary is null;

no rows selected

9. Find the names of all departments whose building name includes the substring 'Watson'.

SQL> select dept_name, building from department where building like '%Watson%';

DEPT_NAME	BUILDING
Biology	Watson
Physics	Watson

10. Find departments whose names contain the string "sci" as a substring, regardless of the case.

SQL> select * from department where lower(dept_name) like '%sci%';

DEPT_NAME	BUILDING	BUDGET
Comp. Sci.	Taylor	100000

11. List the names of all instructors in the Physics department in alphabetic order.

SQL> select name from instructor where dept_name like 'Physics' order by name asc;

NAME
Einstein
Gold

12. List the entire instructor relation in descending order of salary. If several instructors have the same salary, order them in ascending order by name.

SQL> select * from instructor order by salary desc, name asc;

ID	NAME	DEPT_NAME	SALARY
22222	Einstein	Physics	95000
83821	Brandt	Comp. Sci.	92000
12121	Wu	Finance	90000
33456	Gold	Physics	87000
98345	Kim	Elec. Eng.	80000
76543	Singh	Finance	80000
45565	Katz	Comp. Sci.	75000
76766	Crick	Biology	72000
10101	Srinivasan	Comp. Sci.	65000
58583	Califieri	History	62000
32343	El Said	History	60000

ID	NAME	DEPT_NAME	SALARY
15151	Mozart	Music	40000

12 rows selected.

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Write SQL queries for retrieving data from multiple tables using Joins:

1. Find all possible combinations of instructors and the courses they teach.

SQL> select i.id, i.name, c.course_id, c.title from instructor i, course c, teaches t where i.id = t.id and t.course_id = c.course_id;

```
ID    NAME                 COURSE_I  ID    NAME                 COURSE_I
----- -------------------- --------  ----- -------------------- --------
TITLE                                TITLE
-------------------------------------------------------------------------
10101 Srinivasan           CS-101    12121 Wu                   FIN-201
Intro. to Computer Science           Investment Banking

10101 Srinivasan           CS-315    15151 Mozart               MU-199
Robotics                             Music Video Production

10101 Srinivasan           CS-347    22222 Einstein             PHY-101
Database System Concepts             Physical Principles


ID    NAME                 COURSE_I  ID    NAME                 COURSE_I
----- -------------------- --------  ----- -------------------- --------
TITLE                                TITLE
-------------------------------------------------------------------------
32343 El Said              HIS-351   76766 Crick                BIO-101
World History                        Intro. to Biology

45565 Katz                 CS-101    76766 Crick                BIO-301
Intro. to Computer Science           Genetics

45565 Katz                 CS-319    83821 Brandt               CS-190
Image Processing                     Game Design


ID    NAME                 COURSE_I
----- -------------------- --------
TITLE
-------------------------------------
83821 Brandt               CS-190
Game Design

83821 Brandt               CS-319
Image Processing

98345 Kim                  EE-181
Intro. to Digital Systems


15 rows selected.
```

2. Retrieve the names of all instructors, along with their department names and department building name.

SQL> select i.name, i.dept_name, d.building from instructor i, department d where i.dept_name = d.dept_name;

```
NAME                 DEPT_NAME            BUILDING
-------------------- -------------------- ------------
Srinivasan           Comp. Sci.           Taylor
Wu                   Finance              Painter
Mozart               Music                Packard
Einstein             Physics              Watson
El Said              History              Painter
Gold                 Physics              Watson
Katz                 Comp. Sci.           Taylor
Califieri            History              Painter
Singh                Finance              Painter
Crick                Biology              Watson
Brandt               Comp. Sci.           Taylor

NAME                 DEPT_NAME            BUILDING
-------------------- -------------------- ------------
Kim                  Elec. Eng.           Taylor

12 rows selected.
```

3. Find the names of instructors who have taught at least one course.

SQL> select distinct i.id, i.name from instructor i, teaches t where i.id = t.id;

```
ID    NAME
----- --------------------
10101 Srinivasan
12121 Wu
15151 Mozart
22222 Einstein
32343 El Said
45565 Katz
76766 Crick
83821 Brandt
98345 Kim

9 rows selected.
```

4. For the student with ID 12345 (or any other value), show all course_id and title of all courses registered for by the student.

SQL> select s.id, c.course_id, c.title from student s, course c, takes t where s.id = '12345' and s.id = t.id and t.course_id = c.course_id;

```
ID    COURSE_I TITLE
----- -------- --------------------------------
12345 CS-101   Intro. to Computer Science
12345 CS-190   Game Design
12345 CS-315   Robotics
12345 CS-347   Database System Concepts
```

5. Find instructor names and course identifiers for instructors in the Computer Science department.

SQL> select distinct i.name, t.course_id from instructor i, teaches t where i.dept_name like 'Comp. Sci.' and i.id = t.id;

```
NAME                 COURSE_I
-------------------- --------
Brandt               CS-190
Brandt               CS-319
Katz                 CS-101
Katz                 CS-319
Srinivasan           CS-101
Srinivasan           CS-315
Srinivasan           CS-347

7 rows selected.
```

6. For all instructors in the university who have taught some course, find their names and the course ID of all courses they taught.

SQL> select distinct i.name, t.course_id from instructor i, teaches t where i.id = t.id;

```
NAME                 COURSE_I
-------------------- --------
Brandt               CS-190
Brandt               CS-319
Crick                BIO-101
Crick                BIO-301
Einstein             PHY-101
El Said              HIS-351
Katz                 CS-101
Katz                 CS-319
Kim                  EE-181
Mozart               MU-199
Srinivasan           CS-101

NAME                 COURSE_I
-------------------- --------
Srinivasan           CS-315
Srinivasan           CS-347
Wu                   FIN-201

14 rows selected.
```

7. Find the names of all instructors whose salary is greater than at least one instructor in the Biology department. Or Find the names of all instructors who earn more than the lowest paid instructor in the Biology department.

SQL> select name from instructor where salary > (select min(salary) from instructor where dept_name like 'Biology');

```
NAME
--------------------
Wu
Einstein
Gold
Katz
Singh
Brandt
Kim

7 rows selected.
```

8. Find full details of instructors who teach at least one course.

SQL> select distinct i.* from instructor i, teaches t where i.id = t.id;

ID	NAME	DEPT_NAME	SALARY
10101	Srinivasan	Comp. Sci.	65000
12121	Wu	Finance	90000
15151	Mozart	Music	40000
22222	Einstein	Physics	95000
32343	El Said	History	60000
45565	Katz	Comp. Sci.	75000
76766	Crick	Biology	72000
83821	Brandt	Comp. Sci.	92000
98345	Kim	Elec. Eng.	80000

9 rows selected.

9. Find the instructor names and the courses they taught for all instructors in the Biology department who have taught some course.

SQL> select distinct i.name, c.title from instructor i, course c, teaches t where i.dept_name like 'Biology' and i.id = t.id and t.course_id = c.course_id;

NAME	TITLE
Crick	Genetics
Crick	Intro. to Biology

10. Find the set of all courses taught either in Fall 2009 or in Spring 2010, or both.

SQL> select course_id from teaches where (semester like 'Fall' and year like 2009) or (semester like 'Spring' and year like 2010);

COURSE_I
CS-101
CS-315
CS-347
FIN-201
MU-199
PHY-101
HIS-351
CS-101
CS-319
CS-319

10 rows selected.

11. Find all courses taught in the Fall 2009 semester but not in the Spring 2010 semester.

SQL> select course_id from teaches where (semester like 'Fall' and year like 2009) and not (semester like 'Spring' and year like 2010);

```
COURSE_I
--------
CS-101
CS-347
PHY-101
```

12. Find the names of all students who have taken any Comp. Sci. course ever. (there should be no duplicate names)

SQL> select distinct s.name from student s, takes t, course c where s.id like t.id and t.course_id like c.course_id and c.dept_name like 'Comp. Sci.';

```
NAME
--------------------
Bourikas
Brown
Levy
Shankar
Williams
Zhang

6 rows selected.
```

13. Display the IDs of all instructors who have never taught a course. (Don’t write nested query)

SQL> (select id from instructor) minus (select id from teaches);

```
ID
-----
33456
58583
76543
```