**Database Engineering**

**Consider the following University database, where the primary keys are underlined. Give an expression in SQL for each of the following queries.**



**create table** *department*

(*dept\_name* **varchar** (20),

*building* **varchar** (15),

*budget* **numeric** (12,2),

**primary key** (*dept name*));

**create table** *course*

(*course\_id* **varchar** (7),

*title* **varchar** (50),

*dept\_name* **varchar** (20),

*credits* **numeric** (2,0),

**primary key** (*course\_id*),

**foreign key** (*dept\_name*) **references** *department (dept\_name) on update cascade on delete cascade*);

**create table** *instructor*

(*ID* **varchar** (5),

*name* **varchar** (20) **not null**,

*dept\_name* **varchar** (20),

*salary* **numeric** (8,2),

**primary key** (*ID*),

**foreign key** (*dept\_name*) **references** *department (dept\_name) on update cascade on delete cascade*);

**create table** *section*

(*course\_id* **varchar** (8),

*sec\_id* **varchar** (8),

*semester* **varchar** (6),

*year* **numeric** (4,0),

*building* **varchar** (15),

*room\_number* **varchar** (7),

*time\_slot\_id* **varchar** (4),

**primary key** (*course\_id*, *sec\_id*, *semester*, *year*),

**foreign key** (*course\_id*) **references** *course(course\_id) on update cascade on delete cascade*);

**create table** *teaches*

(*ID* **varchar** (5),

*course\_id* **varchar** (8),

*sec\_id* **varchar** (8),

*semester* **varchar** (6),

*year* **numeric** (4,0),

**primary key** (*ID*, *course\_id*, *sec\_id*, *semester*, *year*),

**foreign key** (*course\_id*, *sec\_id*, *semester*, *year*) **references** *section on update cascade on delete cascade*,

**foreign key** (*ID*) **references** *instructor(ID) on update cascade on delete cascade* );

1. Find the department names of all instructors
2. Find the names of all instructors in the Computer Science department who have salary

greater than $70,000.

1. “Retrieve the names of all instructors, along with their department names and department building name.”
2. find instructor names and course identifiers for instructors in the Computer Science department,
3. “For all instructors in the university who have taught some course, find their names and the course ID of all courses they taught
4. “List the names of instructors along with the the titles of courses that they teach.”

“Find the names of all instructors whose salary is greater than at least one instructor in the Biology department.

1. “Find the names of all departments whose building name includes the substring

‘Watson’.”

1. To list in alphabetic order all instructors in the Physics department,
2. list the entire *instructor* relation in descending order of *salary*
3. find the names of instructors with salary amounts between $90,000 and $100,000,
4. “Find the instructor names and the courses they taught for all instructors in the

Biology department who have taught some course.

1. find the set of all courses taught either in Fall 2009 or in Spring 2010, or both,
2. find the set of all courses taught in the Fall 2009 as well as in Spring 2010
3. find all courses taught in the Fall 2009 semester but not in the Spring 2010 semester
4. find all instructors who appear in the *instructor* relation with null values for *salary*,
5. “Find the average salary of instructors in the Computer Science department.
6. “Find the total number of instructors who teach a course in the Spring 2010 semester
7. find the number of tuples in the *course* relation
8. “Find the average salary in each department.
9. “Find the average salary of all instructors.
10. “Find the number of instructors in each department who teach a course in the Spring 2010 semester.”
11. “Find the average salary of instructors in those departments where the average salary is more than $42,000.”
12. “For each course section offered in 2009, find the average total credits (*tot cred*) of all students enrolled in the section, if the section had at least 2 students.”
13. “Find all the courses taught in the both the Fall 2009 and Spring 2010 semesters.”
14. find all the courses taught in the Fall 2009 semester but not in the Spring 2010 semester,
15. “find the total number of (distinct) students who have taken course sections taught by the instructor with *ID* 110011”
16. “Find the names of all instructors whose salary is greater than at least one instructor in the Biology department.”
17. find the names of all instructors that have a salary value greater than that of each instructor in the Biology department.
18. Find those departments for which the average salary is greater than or equal to all average salaries:
19. Delete all tuples in the *instructor* relation pertaining to instructors in the Finance department.
20. Delete all instructors with a salary between 13,000 and 15,000.
21. Delete all tuples in the *instructor* relation for those instructors associated with a department located in the Watson building.
22. Delete the records of all instructors with salary below the average at the university.
23. If a salary increase is to be paid only to instructors with salary of less than $70,000
24. “Give a 5 percent salary raise to instructors whose salary is less than average”
25. “Find all students who have not taken a course”
26. create a view that lists all course sections offered by the Physics department in the Fall 2009 semester with the building and room number of each section.
27. Find the instructor having second highest salary.