

1	Q2	Q3	Total
25	20	20	65

Q4 (Bonus)
10

CS3431 (Database Systems I)
Final Exam
B-term, 2011
(75 Minutes)

Student Name:

WPI ID:

Total 9 Pages. Answer in the same sheet.

Question 1 (SQL Queries)

Given the following relations from a university registration system:

Department(ID, name, address) ----- short name D
Faculty(ID, deptID, firstName, lastName, joinYear) ----- short name F
Course(ID, deptID, name, numOfCredits) ----- short name C
Student(ID, deptID, firstName, LastName, joinYear) ----- short name S
Registration(studentID, courseID, semester, facultyID, grade) -- short name R

The primary key in each relation is underlined. Each faculty member and each course belongs to exactly one department. Each student also belongs to one department. However, a student can take courses outside his/her department.

(1) [5 points]: Write SQL query to report faculty members who have joined after 2005. Sort them ascending by their last names

(2) [5 points]: Write SQL query to report the number of courses offered by a department named 'ComputerScience'

Department(ID, name, address) ----- short name D
Faculty(ID, deptID, firstName, lastName, joinYear) ----- short name F
Course(ID, deptID, name, numOfCredits) ----- short name C
Student(ID, deptID, firstName, LastName, joinYear) ----- short name S
Registration(studentID, courseID, semester, facultyID, grade) -- short name R

(3) [5 points]: For courses that are taught with less than 10 registered students, report the course id and the corresponding semester

(4) [5 points]: Report the student Ids who got grade 'A' in semester 'B11'. Eliminate any duplicates (student id should not appear many times)

Department(ID, name, address) ----- short name D
Faculty(ID, deptID, firstName, lastName, joinYear) ----- short name F
Course(ID, deptID, name, numOfCredits) ----- short name C
Student(ID, deptID, firstName, LastName, joinYear) ----- short name S
Registration(studentID, courseID, semester, facultyID, grade) -- short name R

(5) [5 points]: Report courses that are not taught in semester 'B10' but taught in semester 'B11'. You should report the course Id, name, and number of credits.

Question 2 (Triggers & Assertions)

Department(ID, name, address) ----- short name D

Faculty(ID, deptID, firstName, lastName, joinYear) ----- short name F

Course(ID, deptID, name, numOfCredits) ----- short name C

Student(ID, deptID, firstName, LastName, joinYear) ----- short name S

Registration(studentID, courseID, semester, facultyID, grade) -- short name R

(1)[10 points]: Create trigger(s) that make sure that the number of credits for a course cannot decrease or be null. The operation trying to do that should fail and raise an error.

Department(ID, name, address) ----- short name D
Faculty(ID, deptID, firstName, lastName, joinYear) ----- short name F
Course(ID, deptID, name, numOfCredits) ----- short name C
Student(ID, deptID, firstName, LastName, joinYear) ----- short name S
Registration(studentID, courseID, semester, facultyID, grade) -- short name R

(2)[10 points]: Create an assertion that ensures that for any taught course, the number of students does not exceed 75.

Question 3 (Stored Functions)

Department(ID, name, address) ----- short name D
Faculty(ID, deptID, firstName, lastName, joinYear) ----- short name F
Course(ID, deptID, name, numOfCredits) ----- short name C
Student(ID, deptID, firstName, LastName, joinYear) ----- short name S
Registration(studentID, courseID, semester, facultyID, grade) -- short name R

(1)[10 points]: Create a stored function that takes a course Id as an input, and returns the number of semesters in which this course is taught. Name the function *SemesterCount*

Department(ID, name, address) ----- short name D
Faculty(ID, deptID, firstName, lastName, joinYear) ----- short name F
Course(ID, deptID, name, numOfCredits) ----- short name C
Student(ID, deptID, firstName, LastName, joinYear) ----- short name S
Registration(studentID, courseID, semester, facultyID, grade) -- short name R

(2)[5 points]: Using function *SemesterCount*, report courses belonging to department named 'ComputerScience' and taught more than 5 times. You should report the course Id and the number of times it has been taught.

(3)[5 points]: Using function *SemesterCount*, increase the number of credits by 1 to courses offered in 3 semesters only.

Bonus Question (ER Diagram)

Department(ID, name, address) ----- short name D

Faculty(ID, deptID, firstName, lastName, joinYear) ----- short name F

Course(ID, deptID, name, numOfCredits) ----- short name C

Student(ID, deptID, firstName, LastName, joinYear) ----- short name S

Registration(studentID, courseID, semester, facultyID, grade) -- short name R

[10 Points] Provide an ER diagram corresponding to the set of tables above.