

(k) Modify the HOURS attribute of the WORKS_ON tuple with ESSN= '999887777' and PNO= 10 to '5.0'.

```
UPDATE WORKS_ON
SET HOURS = '5.0'
WHERE ESSN= '999887777' AND PNO= 10
```

7.16 Specify the following queries in SQL on the database schema of Figure 2.1.

Answers:

(a) Retrieve the names of all senior students majoring in 'COSC' (computer science).

```
SELECT Name
FROM STUDENT
WHERE Major='COSC'
```

(b) Retrieve the names of all courses taught by professor King in 85 and 86.

```
SELECT CourseName
FROM COURSE, SECTION
WHERE COURSE.CourseNumber=SECTION.CourseNumber AND Instructor='King'
AND (Year='85' OR Year='86')
```

Another possible SQL query uses nesting as follows:

```
SELECT CourseName
FROM COURSE
WHERE CourseNumber IN ( SELECT CourseNumber
                        FROM SECTION
                        WHERE Instructor='King' AND (Year='85' OR Year='86') )
```

(c) For each section taught by professor King, retrieve the course number, semester, year, and number of students who took the section.

```
SELECT CourseNumber, Semester, Year, COUNT(*)
FROM SECTION, GRADE_REPORT
WHERE Instructor='King' AND SECTION.SectionIdentifier=GRADE_REPORT.SectionIdentifier
GROUP BY CourseNumber, Semester, Year
```

(d) Retrieve the name and transcript of each senior student (Class=5) majoring in COSC. Transcript includes course name, course number, credit hours, semester, year, and grade for each course completed by the student.

```
SELECT Name, CourseName, C.CourseNumber, CreditHours, Semester, Year, Grade
FROM STUDENT ST, COURSE C, SECTION S, GRADE_REPORT G
WHERE Class=5 AND Major='COSC' AND ST.StudentNumber=G.StudentNumber AND
G.SectionIdentifier=S.SectionIdentifier AND S.CourseNumber=C.CourseNumber
```

(e) Retrieve the names and major departments of all straight A students (students who have a grade of A in all their courses).

```
SELECT Name, Major
FROM STUDENT
WHERE NOT EXISTS ( SELECT *
                   FROM GRADE_REPORT
                   WHERE StudentNumber= STUDENT.StudentNumber AND NOT(Grade='A'))
```

(f) Retrieve the names and major departments of all students who do not have any grade of A in any of their courses.

```
SELECT Name, Major
FROM STUDENT
WHERE NOT EXISTS ( SELECT *
                  FROM GRADE_REPORT
                  WHERE StudentNumber= STUDENT.StudentNumber AND Grade='A' )
```

7.17 Write SQL update statements to do the following on the database schema shown in Figure 2.1.

Answers:

(a) Insert a new student <'Johnson', 25, 1, 'MATH'> in the database.

```
INSERT INTO STUDENT
VALUES ('Johnson', 25, 1, 'MATH')
```

(b) Change the class of student 'Smith' to 2.

```
UPDATE STUDENT
SET CLASS = 2
WHERE Name='Smith'
```

(c) Insert a new course <'Knowledge Engineering','COSC4390', 3,'COSC'>.

```
INSERT INTO COURSE
VALUES ('Knowledge Engineering','COSC4390', 3,'COSC')
```

(d) Delete the record for the student whose name is 'Smith' and student number is 17.

```
DELETE FROM STUDENT
WHERE Name='Smith' AND StudentNumber=17
```

7.18 Write PASCAL programs with embedded SQL statements in the style shown in Section 7.7 to do the following tasks on the database schema of Figure 2.1. For each program code, define appropriate program variables.

Answers:

We assume that appropriate PASCAL program variables SECTION_ID,