Relational Algebra Sample Question ANSWER

Using the following two relations/tables:

STUDENT

STU_CODE	PROF_CODE
100278	
128569	2
512272	4
531235	2
531268	
553427	1

PROFESSOR

PROF_CODE	DEPT_CODE
1	2
2	6
3	6
4	4

(a) Explain the process(steps) in terms of relational algebra operations which are used to produce a natural join

- **CROSS (CARTESIAN) PRODUCT pair every row of STUDENT with every row of PROFESSOR (1 mk)**
    - **RESULT1 = STUDENT X PROFESSOR (1 mk)**
- **SELECT to find matching tuples (1 mk)**
    - **RESULT2 = $\sigma_{\text{student.prof\_code = professor.prof\_code}}$ RESULT1 (2 mks)**
- **PROJECT to remove one of the sets of join attributes (1 mk)**
    - **RESULT3 = $\Pi_{\text{stud\_code, student.prof\_code, dept\_code}}$ RESULT2 (2 mks)**

(b) Show the output which will be produced from these two relations/tables when the following are carried out:

(i) equijoin of STUDENT to PROFESSOR

STU_CODE	STUDENT. PROF_CODE	PROFESSOR. PROF_CODE	DEPT_CODE
128569	2	2	6
512272	4	4	4
531235	2	2	6
553427	1	1	2

(ii) natural join of STUDENT to PROFESSOR

STU_CODE	PROF_CODE	DEPT_CODE
128569	2	6
512272	4	4
531235	2	6
553427	1	2

(iii) a right outer join of STUDENT to PROFESSOR, and a

STU_CODE	STUDENT. PROF_CODE	PROFESSOR. PROF_CODE	DEPT_CODE
128569	2	2	6
512272	4	4	4
531235	2	2	6
553427	1	1	2
		3	6

(iv) full outer join of STUDENT to PROFESSOR

STU_CODE	STUDENT. PROF_CODE	PROFESSOR. PROF_CODE	DEPT_CODE
128569	2	2	6
512272	4	4	4
531235	2	2	6
553427	1	1	2
100278			
531268			
		3	6