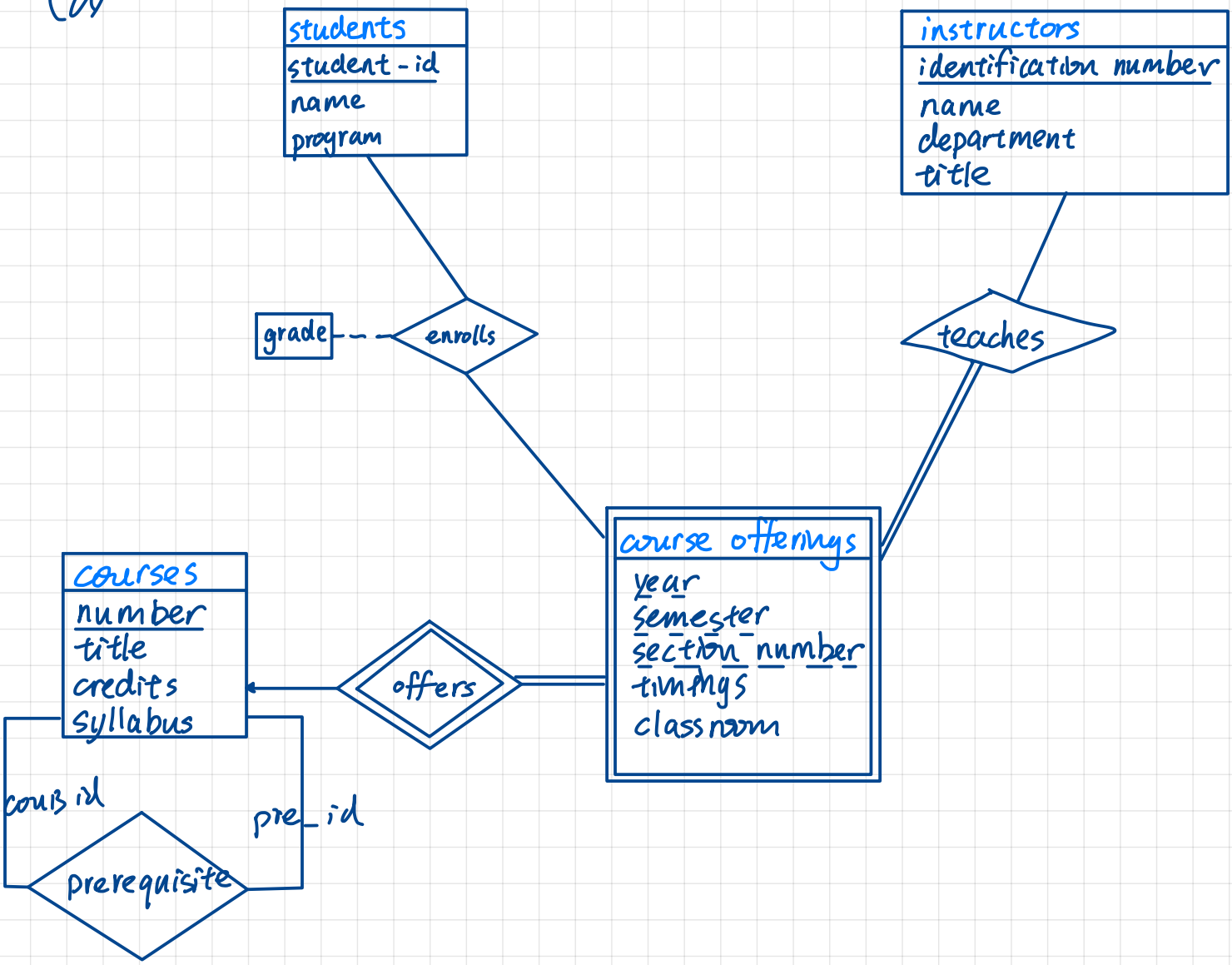
Ans 1

(a)



(b) students (student-id, name, program)

instructors (identification number, name, department, title)

courses (number, title, credits, syllabus)

course_offerings (course_number, year, semester, section number, timings, classroom)

enrolls (student-id, course_number, year, semester section num grade)

teaches (inst_id, course_number, year, semester section num)

prerequisites (course-number, prerequisite_number)

A1.2

(a) COURSE.Course_number
SECTION.Course_number
COURSE.Department
PREREQUISITE.Course_number
PREREQUISITE.Course_numbe

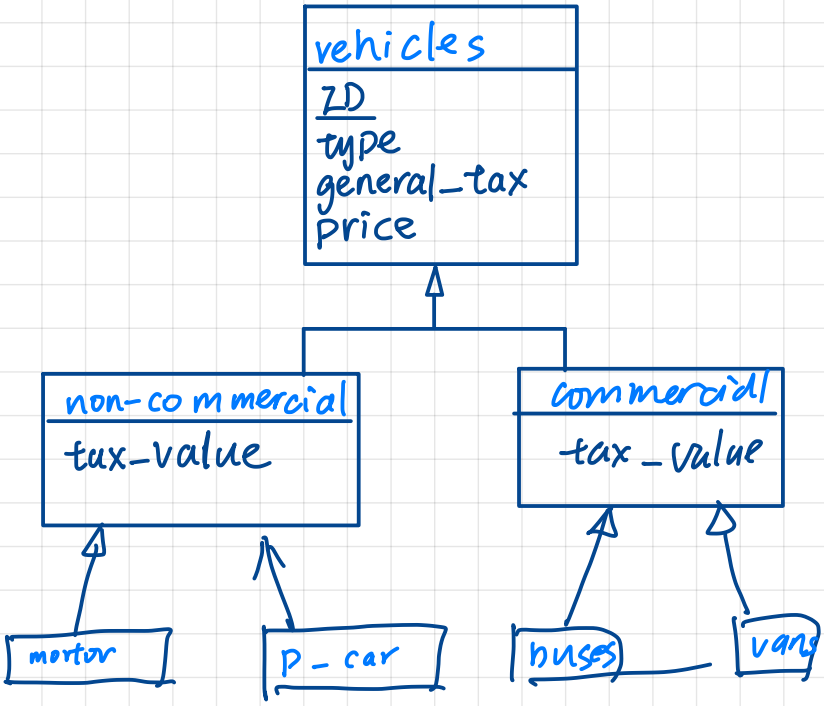
(b) set Course_coursenumber as the number without dept prefix
add a course identification number to each courses

STUDENT remains
COURSE(Course_id, Course_number, Credit_hours
Depatment_id)
DEPARTMENT(Department_id, name)
SECTION(Section_id Course_id, Semester
Year, Instructor)
PREREQUISITE(Course_id Prerequisite_id)

A1.3

Assume : Motorcycle : non commercial
Passenger cars : noncommercial
vans : commercial
Bus : commerized

Assume the company records the type, id, price tax infor



A1.4-10

4 $\pi_{Fname, Minit, Lname, Address}(EMPLOYEE \bowtie_{Dno=Dnumber} \sigma_{Dname="Research"}(DEPARTMENT))$

5, $\pi_{Pnumber, Lname, Address, Bdate}($

$\sigma_{Plocation="Stamford"}(PROJECT)$

$\bowtie_{Dnum=Dnumber} DEPARTMENT$

$\bowtie_{Mgr\_ssn=Ssn} EMPLOYEE$

)

6, $\pi_{Pnumber}($

$\sigma_{Lname="Smith"}(EMPLOYEE)$

$\bowtie_{Ssn=Mgr\_ssn}(DEPARTMENT)$

$\bowtie_{Pnumber=Pnum}(PROJECT)$

)

$\cup \pi_{Pnumber}($

$\sigma_{Lname="Smith"}(EMPLOYEE)$

$\bowtie_{Ssn=Essn}(WORK\_ON)$

)

7. $\Pi_{Fname, Minit, Lname}$ (EMPLOYEE)

$- \Pi_{Fname, Minit, Lname}$ (

EMPLOYEE

$\bowtie_{Ssn = Essn}$ DEPENDENT

)

8 $\Pi_{Fname, Minit, Lname}$ (

DEPARTMET

$\bowtie_{Mgr\_ssn = Ssn}$ EMPLOYEE

$\bowtie_{Ssn = Essn}$ DEPENDENT

).

9. $\Pi_{Em.Ssn}$ (

ρ_{Em} (EMPLOYEE)

$\bowtie_{Em.Super\_Ssn = S.Ssn} \rho_{S}$ (

$\sigma_{FName = "James" \wedge Lname = "Borg"}$ (

EMPLOYEE

)

)

)

10. $\Pi_{E_0.Ssn}$ (

ρ_{E_0}(EMPLOYEE)

$\bowtie_{E_0.Super\_ssn = E_1.Ssn}$ ρ_{E_1}(EMPLOYEE)

$\bowtie_{E_1.Super\_ssn = S.Ssn}$ ρ_S (

$\sigma_{FName = "James" \wedge Lname = "Borg"}$ (

EMPLOYEE

)

)

)

2. It's impossible. Because the query is recursive and which is not supported by RA.