9i) The motor Vehicle Branch administers driving tests and issues driver's licenses. Any person who wants a driver's license must first take a learner's exam at any motor Vehicle Branch in the province. If he/she fails the exam, he can take the exam again any time after a week of the failed exam date, at any branch. If he passes the exam, he is issued a license (type = learner's) with a unique license number. A learner's license may contain a single restriction on it. The person may take this driver's exam at any branch any time before the learner's license expiry date (which is usually set at six months after the license issues date). If he passes the exam, the branch issues him a driver's license. A driver's license must also record if the driver has completed driver's education for insurance purposes.

Create an E-R diagram following these steps.

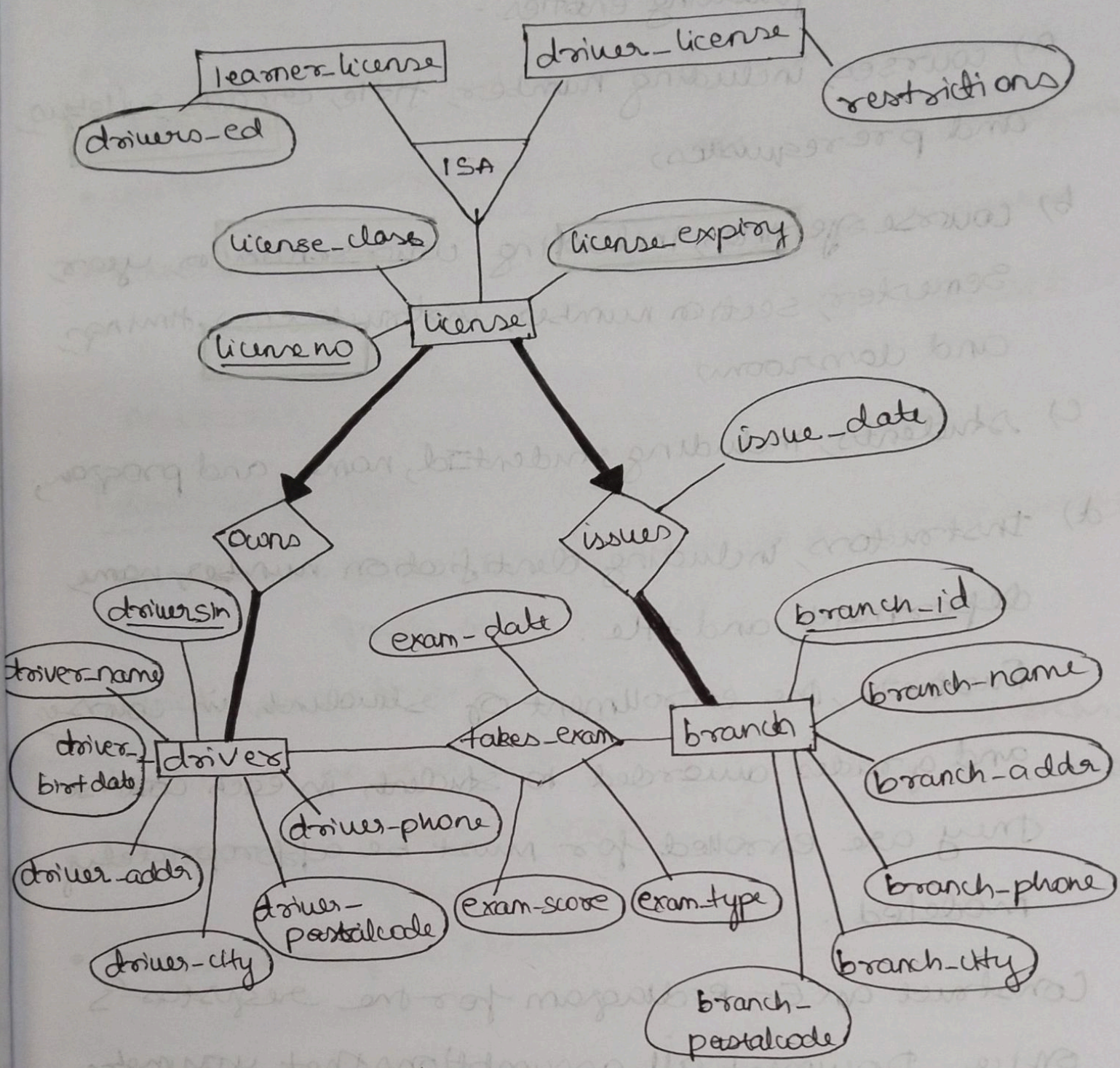
1) Find out the entities in the spec
2) Find out the relationships among the entities.
3) Figure out attributes of the entities and (if any) of the relationships.
4) Figure out constraints between entities and relationships.
5) Check to see if you don't miss anything in spec

Ans 1) The entities in the specification are:-

- Branch
- Driver
- License
- Learner License
- Driver license.

Ans 2) Relationships:-

- takes exam (driver, branch): exam date, exam score, exam type
- owns (license, driver)
- issues (license, branch): issue data
- "ISA" relationship: Learner License, Driver license "is a" license.



Ans 4) Constraints:-

- a [driver] must <own> (at least one) [license].
- a [driver] must <take> at least one exam.
- a [license] must be <owned> by one and only one [driver].
- a [license] must be <issued> by one and only one [branch].
- a [branch] must <issue> at least one license.

Q 2) A university registrar's office maintains data about the following entities:-

a) courses, including number, title, credits, syllabus and prerequisites;

b) course offerings, including course number, year, semester, section number, instructor(s), timings, and classrooms;

c) students, including student-id, name, and program;

d) instructors, including identification number, name, department, and title.

Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled.

Construct an E-R diagram for the registrar's office. Document all assumptions that you make about the mapping constraints.

Ans 2)

Entity sets

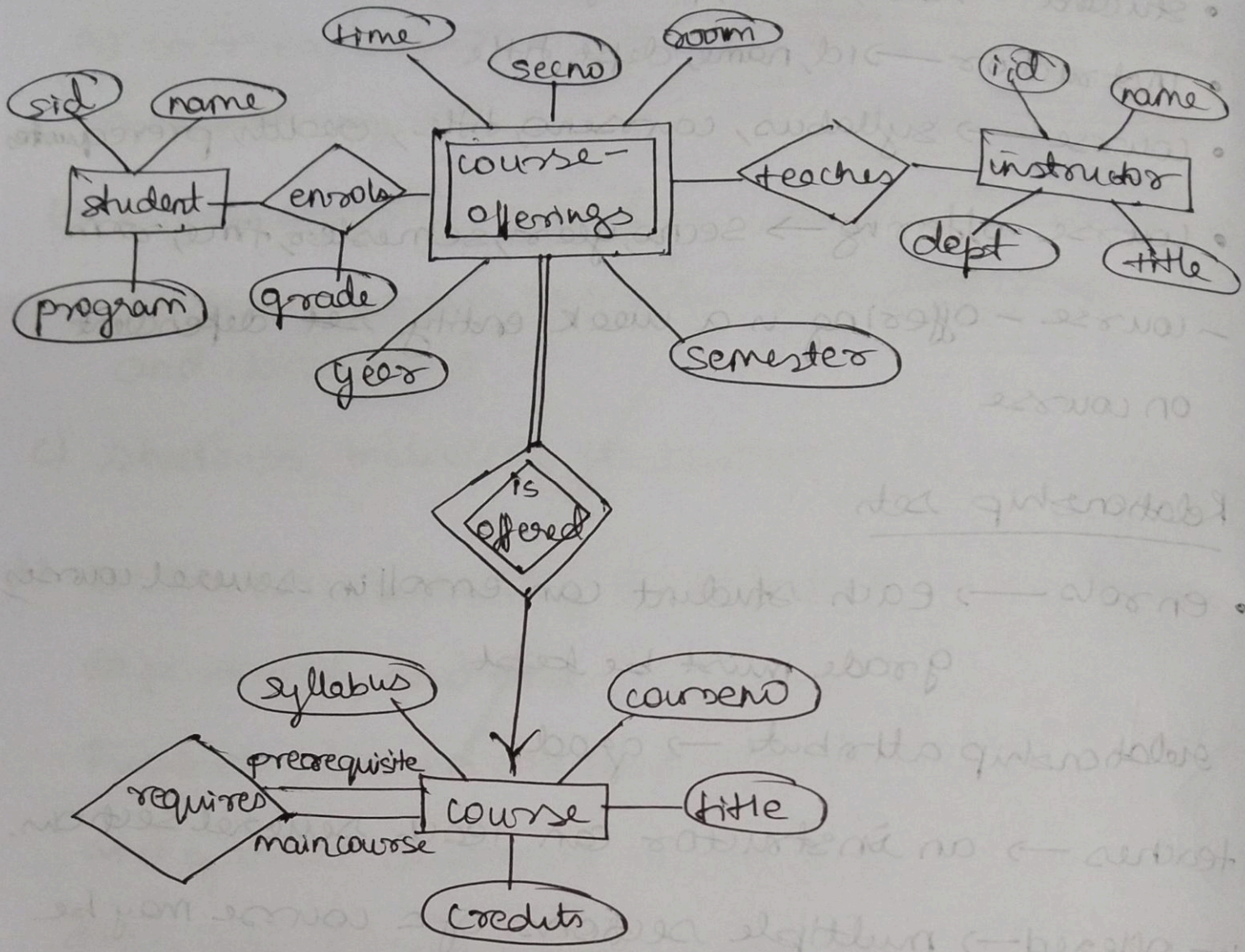
- student → sid, name, program.
- instructor → id, name, dept, title
- course → syllabus, courseno, title, credits, prerequisites
- course-offering → secno, year, semester, time, room.

- course-offering is a week entity set dependent on course

Relationship sets

- enrols → each student can enroll in several courses, grade must be kept.

  relationship attribute → grade.
- teaches → an instructor can teach several sections.
- is-offered → multiple sections of a course may be offered.
- requires → prerequisite, maincourse.



Reducing the E-R diagram to tables

Entities

student table

sid	name	program

course

courseno	title	syllabus	credits

Instructor

iid	name	dept	title

Course-offerings

courseno	secno	year	semester	time	room

Relationships

enrols

sid	courseno	secno	semester	year	grade

teaches

courseno	secno	semester	year	iid

requires

maincourse	prequisite