Database Management System

Exam Topics: Relational Model, Database Design & E-R Diagram.

Question Pattern of Midterm Exam:

1. **Creating an ENTITY-RELATIONSHP Diagram From a Scenario.** **[10]**
2. **Explain an ENTITY-RELATIONSHP DIAGRAM.** **[5]**
3. **Convert E-R Diagram into RELATIONAL DATABASE SCHEMA** **[6]**
4. **Draw ER diagram from RELATIONAL DATABASE SCHEMA.** **[4]**
5. **MCQ or Basic Theory Types Questions. (Optional)**

Suggestion/Guideline:

Q-1: CREATING AN ENTITY-RELATIONSHP DIAGRAM FROM SCENARIO:

A. The Motor Vehicle Branch administers driving tests and issues driver's licenses. Any person who wants a driver's license must ¯rst 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 his 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 issue 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 a 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.

B. The Prescriptions-R-X chain of pharmacies has offered to give you a free life-time supply of medicines if you design its database. Given the rising cost of health care, you agree. Here is the information that you gather.

1. Patients are identified by SSN, and their names, addresses, and also ages.
2. Doctors are identified by an SSN, for each doctor, the name, specialty and years of experience must be recorded.
3. Each pharmaceutical company is identified by name and has a phone number.
4. For each drug, the trade name and formula must be recorded. Each drug is sold by a given pharmaceutical company, and the trade name identifies a drug uniquely from among the products of that company. If a pharmaceutical company is deleted, you need not keep track of its products any longer.
5. Each pharmacy has a name, address, and phone number.
6. Every patient has a primary physician. Every doctor has at least one patient.
7. Each pharmacy sells several drugs and has a price for each. A drug could be sold at several pharmacies, and the price could vary from one pharmacy to another.
8. Doctors prescribe drugs for patients. A doctor could prescribe one or more drugs for several patients, and a patient could obtain prescriptions from several doctors. Each prescription has a date and a quantity associated with it. You can assume that if a doctor prescribes the same drug for the same patient more than once, only the last such prescription needs to be stored.
9. Pharmaceutical company have long-term contracts with pharmacies. A pharmaceutical company can contract with several pharmaceutical companies. For each contract, you have to store a start date, and end date, and the text of the contract.
10. Pharmacies appoint a supervisor for each contract. There must always a supervisor for each contract.

-End of the Spec. Tasks:
1. Draw a ER diagram that captures the above information. Identify and contraints that are not captured by your ER-diagram.
2. How would your design change if each drug must be sold at a fixed price by all the pharmacies?
3. How would your design change if the design requirements change as follows: If a doctor prescribes the same drug for the same patient more than once, several such prescriptions may have to be stored separately?

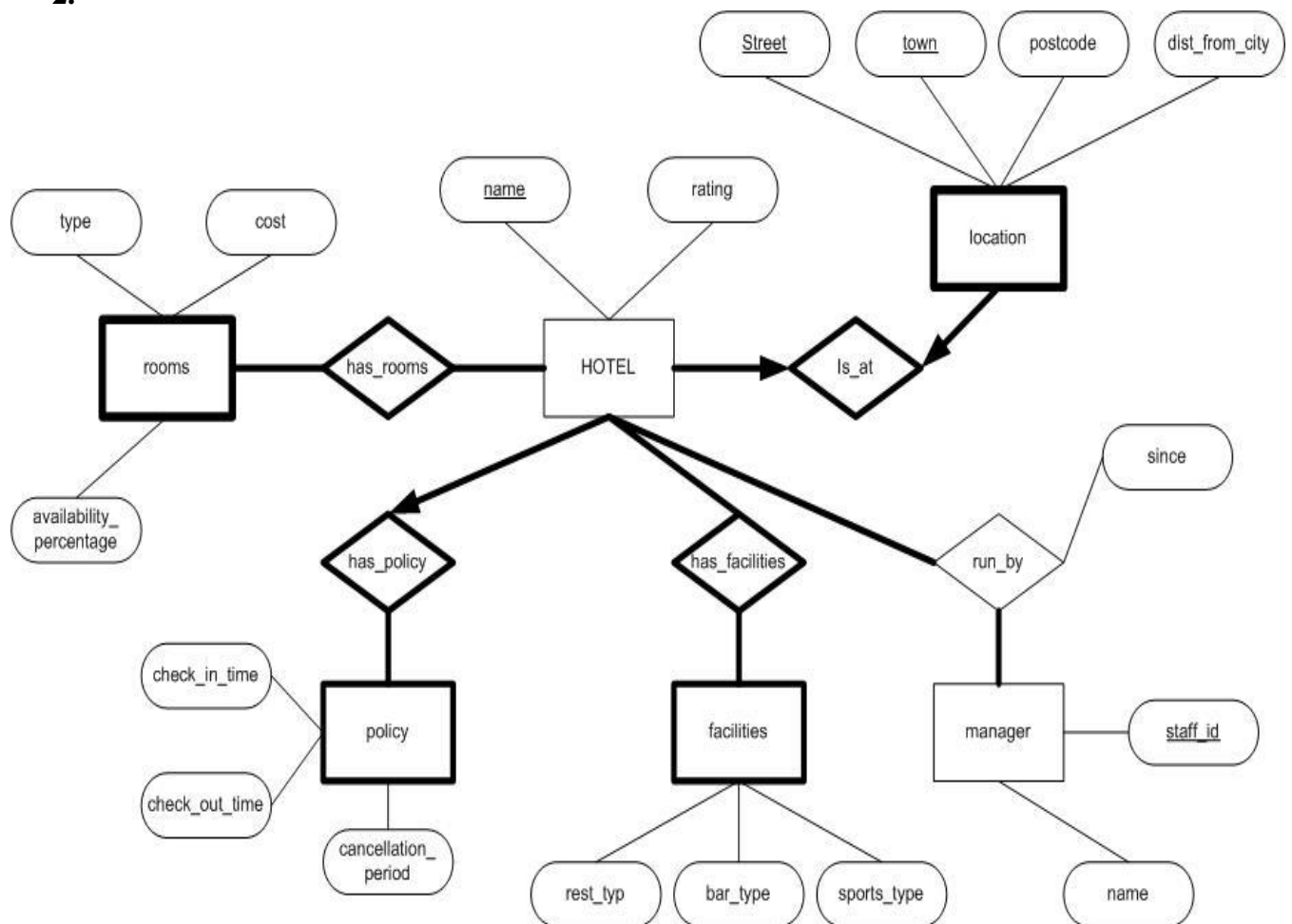**[This problem is most important.]**

Q-2: EXPLAIN A ENTITY-RELATIONSHIP DIAGRAM:
1.
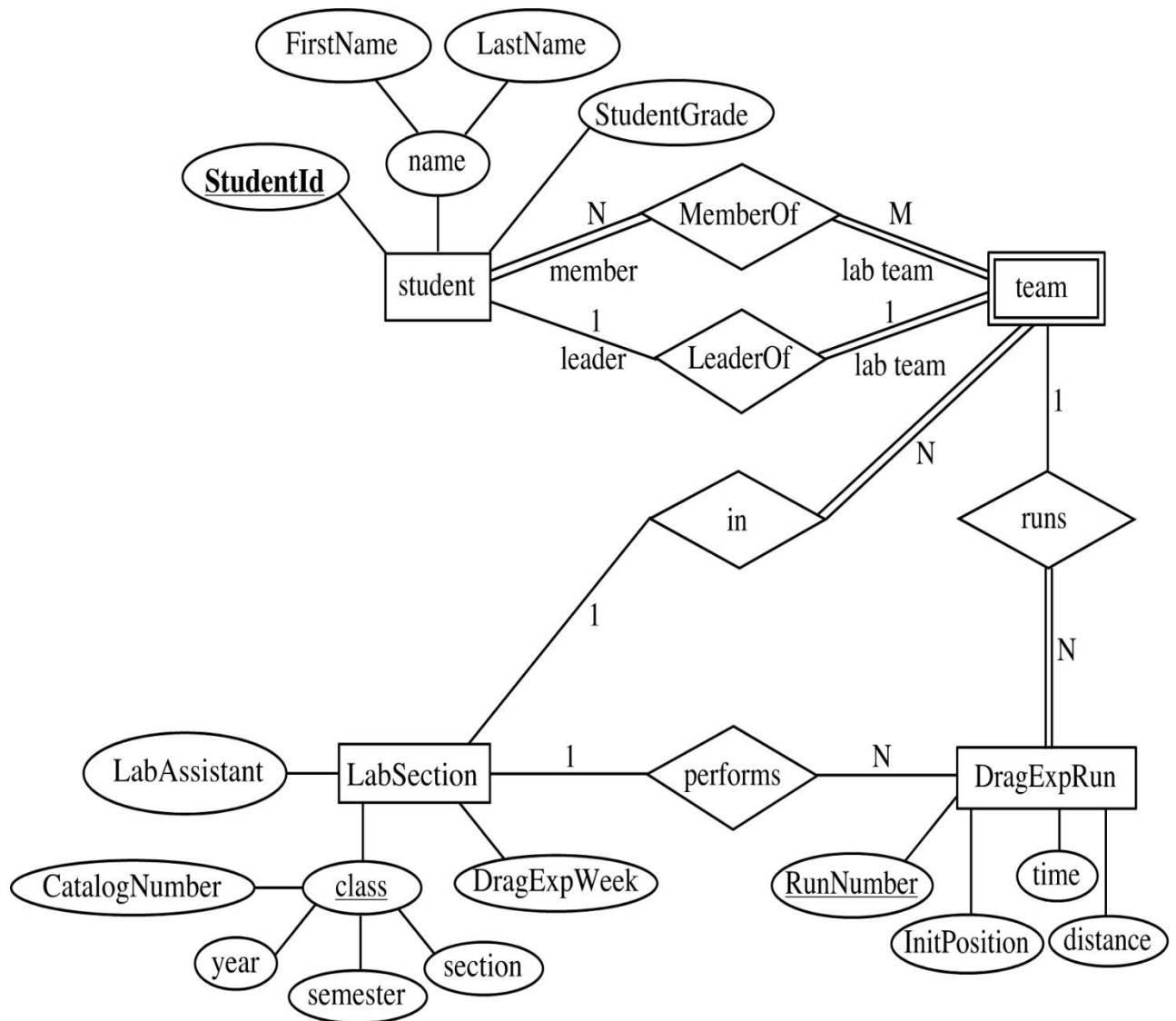
[This Diagram is most important.]

2.

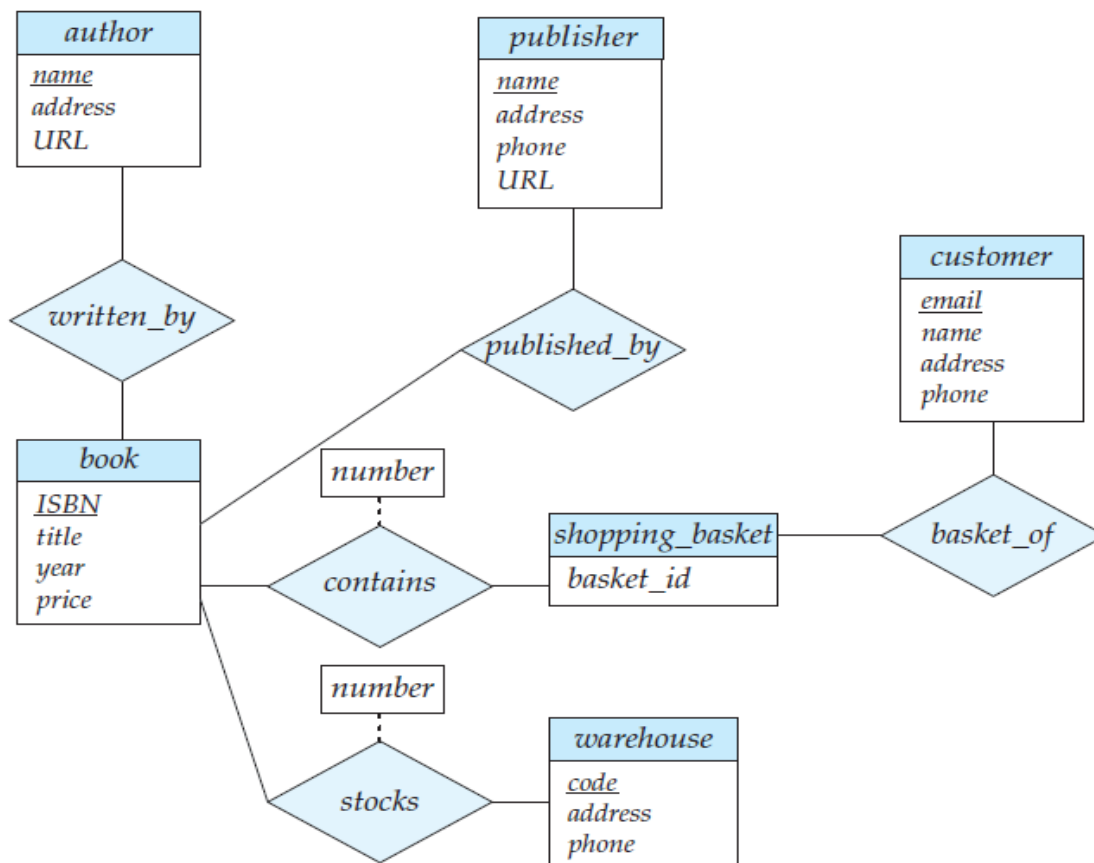## Q-3: CREATING A E-R DIAGRAM FROM RELATIONAL SCHEMA.

1. employee (person name, street, city)
   works (person name, company name, salary)
   company (company name, city)
   branch(branch name, branch city, assets)
   customer (customer name, customer street, customer city)
   loan (loan number, branch name, amount)
   borrower (customer name, loan number)
   account (account number, branch name, balance)
   depositor (customer name, account number)

2. classroom(building, room number, capacity)
   department(dept name, building, budget)
   course(course id, title, dept name, credits)
   instructor(ID, name, dept name, salary)
   section(course id, sec id, semester, year, building, room number, time slot id)
   teaches(ID, course id, sec id, semester, year)
   student(ID, name, dept name, tot cred)
   takes(ID, course id, sec id, semester, year, grade)
   advisor(s ID, i ID)
   time slot(time slot id, day, start time, end time)
   prereq(course id, prereq id)

[Hope, you will get it in exam hall.]

Q-4: CREATING A RELATIONAL DATABASE SCHEMA.
   1.

2.

ER Diagram:

- **Lot** entity with attributes: LotNumber (key), CreateDate, Cost-Of-Materials
- **Production Units** entity with attributes: serial-# (key), exactWeight, ProductType, ProductDesc, qualityTest?
- **Raw Materials** entity with attributes: type, material-ID (key), UnitCost
- **Includes** relationship between Lot and Production Units
- **Created From** relationship between Lot and Raw Materials, with attribute: Units