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Question 1C (5 Marks)

MULTIPLE-CHOICE-QUESTIONS: Encircle only one correct answer

- Many airline reservation and telephone directory systems that support large number of concurrent transactions with little delay are categorized as _____.
a) OLTP ✓ b) RTS c) AI d) OFTP
- _____ is the ability to change the schema at one level of a database system without having to change the schema at next higher level.
a) data exchange ✓ b) data dependence c) data independence d) data binding
- _____ data independence changes the conceptual scheme without changing the external scheme.
a) physical ✓ b) internal c) low-level d) logical
- _____ language is used to define both the internal and conceptual scheme when there is no separation between these schemes.
a) VDL ✓ b) SDL c) DDL d) DML
- A high-level DML used in stand-alone interactive manner is called _____.
a) query ✓ b) machine c) assembly d) natural
- The description of schema constructs and constraints is called _____ data.
a) dynamic ✓ b) beta c) meta d) key
- The description of a database is called database _____.
a) schema ✓ b) structure c) construct d) implementation
- A state that satisfies the structure and constraints of a scheme is called _____ state.
a) invalid ✓ b) true c) real d) valid
- The database state is called _____ of the schema.
a) intension ✓ b) extension c) expansion d) definition
- The ability to modify the data structure and not have to change the programs using that data is called:
a) data dictionary ✓ b) data independence c) data integrity d) referential integrity

Question 2: (5 Marks)

TRUE or FALSE: Encircle only one correct answer

1. The conceptual scheme of a database cannot be changed once it is defined. (T F) ✓
- * 2. An advantage of the database approach is the creation of maximum data redundancy. (T F) ✓
3. A database administrator designs, constructs, and manages the databases. (T / F) ✓
- * 4. Database scheme is specified during database design. (T / F) ✓
5. Database scheme changes very frequently. (T F) ✓
- * 6. The database state is also called an instance of database. (T / F) ✓
- * 7. Schema diagram does not show the data types of each data item. (T / F) ✓
8. Composite or multivalued attributes are allowed in relational model. (T F) ✓
- * 9. A superkey can have redundant attributes. (T / F / T) ✓
10. A foreign key can have a null value. (T / F) ✓

Question 3 : (12 Marks)

A chain of pharmacies has offered to give you a free lifetime supply of medicine if you design its database. Given the rising cost of health care, you agree. Here's the information that you gather:

- Patients are identified by an SSN, and their names, addresses, and ages must be recorded.
- Doctors are identified by an SSN. For each doctor, the name, specialty, and years of experience must be recorded.
- Each pharmaceutical company is identified by name and has a phone number.
- * • For each drug, the trade name and formula must be recorded. Each drug is made 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.
- ✓ • Each pharmacy has a name, address, and phone number.
- ✓ • Every patient comes to his Doctor. Every doctor has at least one patient.
- * • (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.
- * • 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.]
- Pharmaceutical companies have long-term contracts with pharmacies. A pharmaceutical company can contract with several pharmacies, and a pharmacy can contract with several

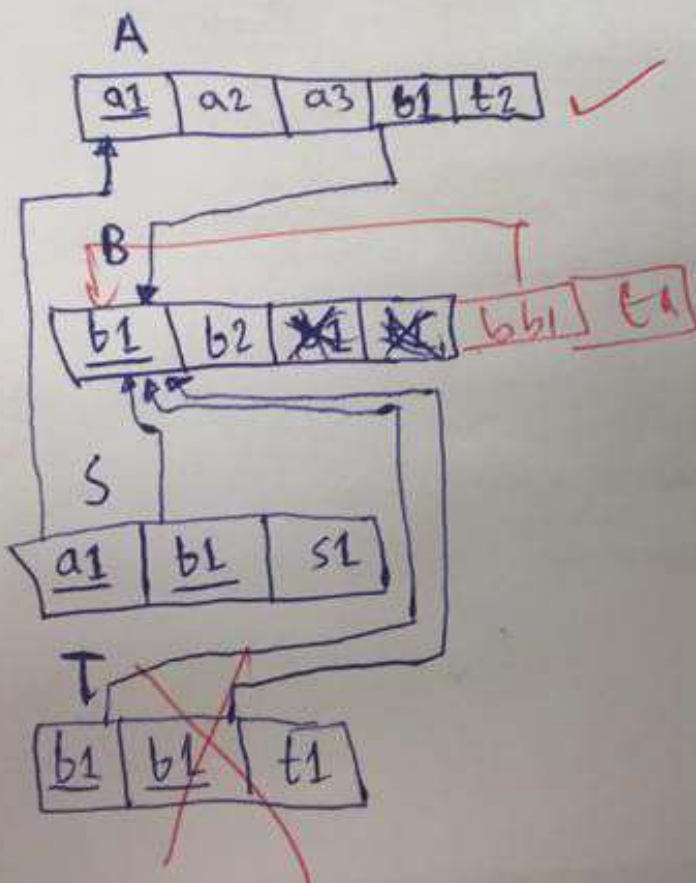
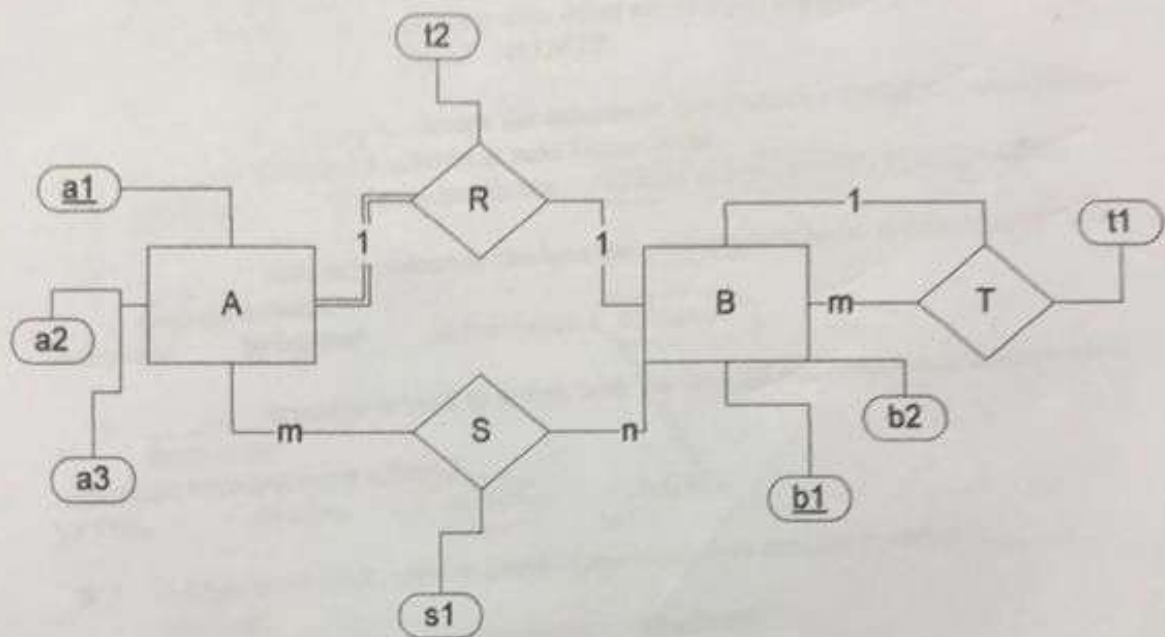
pharmaceutical companies. For each contract, you have to store a start date, an end date, and the text of the contract.

Pharmacies appoint a supervisor for each contract. There must always be a supervisor for each contract, but the contract supervisor can change over the lifetime of the contract.

Draw an ER diagram that captures the information about the chain of pharmacies. Underline primary keys and show the total participation.

Question 4 : (8 Marks)

Map the following ER diagram into a relation schema



S/8

