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CWID:

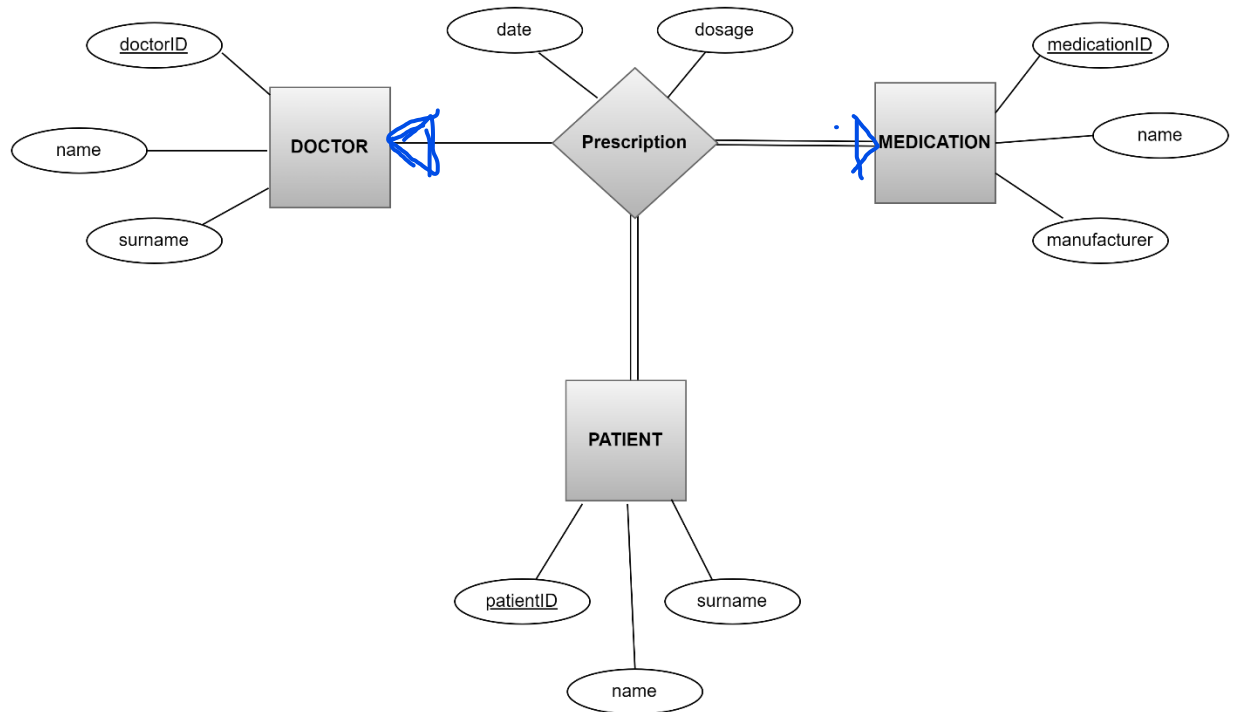
EXAM INSTRUCTIONS

Answer ALL questions.

Time allowed: 2 hours.

Part I (20 points)

1. Explain the relationship in the Entity-Relationship Diagram (ERD) in your own words [4 pts].



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2. Write down all business rules that are represented in the above ERD [6 pts].

3. Which normal form does the ERD satisfies? Provide an explanation [4 pts].

4. What is the different between the third normal form (3NF) and Boyce-Codd normal form (BCNF)? [4 pts].

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Part II (30 points)

5. Create an Entity Relationship Diagram (ERD) using CHENs notation after studying the Carbon Accounting Database (ACME Technologies) business rules below. ACME Technologies is a group of companies manufacturing body virtual reality suits, communicators, movie projectors and many other consumer gadgets. Also, you are required to present the relation schemas including primary keys (PKs) and foreign keys (FKs) that fully represent the database at a logical level.

Carbon Accounting Database (ACME Technologies) business rules include:

- A single database will be created that will track the carbon footprints of all the companies registered with the ACME Technologies group.
- Each company has a name and consists of one or more departments.
- Each company has one employee that is the CEO of the company. That employee may only be the CEO of one company, and not all employees are CEOs.
- Each department must have exactly one employee who is the Green Champion – the person responsible for any initiatives related to the carbon footprint of the department. That employee may only be the Green Champion for a single department, and not all employees are Green Champions.
- The following data must be recorded for each employee: name and surname.
- Some departments have products that they are responsible for. Each product must be allocated to exactly one department and must have a description.
- The main purpose of the database is to record carbon transactions. Each carbon transaction is accounted for by exactly one department. Optionally, the single product that the carbon transaction relates to can also be recorded.
- The following data must be recorded for each carbon transaction: date and value.

Rubric	pts
Entities	5
Relationships with correct participation and cardinalities	12
Relation schemas showing PKs and correct FK postings	12
Correct CHEN notation	1
Total	30

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Final Exam Fall 2023
CS425: Database Organization, IIT.edu

[Draw Entity Relationship Diagram (ERD) here]

