



Princess Sumaya جامعة  
University الأميرة سميرة  
for Technology للتكنولوجيا

**Database Systems (CS11323)**  
**Mid-Term Exam, Spring 2025/2026**  
**Saturday 18<sup>th</sup> April 2026**

**Student ID:**..... **Name(بالعربي):**.....

**Select Your Section**

Instructor	Schedule	Select
Dr. Nailah Almadi	Sun, Tues, Thu 8:00 - 9:00	
	Sun, Tues, Thu 10:00 - 11:00	
	Mon, Wed 09:30 - 11:00	
Ms. Omimah Ismail	Sun, Tues, Thu 11:00 - 12:00	
	Mon, Wed 12:30 - 14:00	

**Course Learning Outcomes**

1. Explain basic data management concepts (@1) (#K)
2. Design a database system using the entity-relationship diagram (ERD) and the Enhanced entity-relationship diagram (EER) (@2) (#S)
3. Describe the basic concepts of the relational data model, tables and relational algebra (@1) (#K)
4. Apply the normalization process to relational databases (@2) (#S)
5. Use the Structured Query Language (SQL) to create, manipulate and query a database system (@2) (#S)

Question	CLO	Points	Score
1	1	10	
2	2	5	
3	2	5	
4	3	5	
5	3	5	
Total		30	

**Form A**

## Question 1: Choose the best option below

(10 points)

**1. A data model is:**

- A. A set of rules to store data physically
- B. A programming interface
- C. A network protocol
- D. A set of concepts used to describe database structure

**2. Which schema level describes physical storage structures?**

- B. Logical schema
- A. External schema
- B. Internal schema
- C. Conceptual schema

**3. Physical data independence means:**

- A. Changing internal schema without affecting conceptual schema
- B. Changing user interface
- C. Changing conceptual schema only
- D. Changing queries

**4. Which of the following best describes data?**

- A. Facts that can be recorded and have meaning
- B. Database schemas
- C. Computer programs
- D. Hardware components

**5. A relationship is**

- A. A meaningful dependency between entities
- B. An item in an application
- C. A collection of related entities
- D. Related data

**6. The weak entity is an entity that has:**

- A. No attributes
- B. No relationships
- C. No key attribute
- D. A composite attribute

**7. The Is-A relationship is shown in ER diagram using: (explanation: EER is an Enhanced ER, so it is an ER!!)**

- A) Recursive relationship
- B) ER cannot show this type of relationships
- C) 1:N with total participation relationship.
- D) class-subclass relationship.

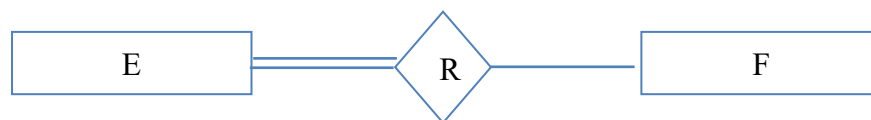
8. What statement is **not true** regarding inheritance in a generalization hierarchy?

- A) Every subtype entity is also a supertype entity (yes it could be, so it is true)
- B) The attributes of the supertype apply to all of the subtypes (yes this is true)
- C) Attributes inherited from a supertype are **not** shown in an ERD (this is true, we don't show inherited attributes from parent on child)
- D) None of the above

9. The primary key of a table is chosen among:

- A) All attributes
- B) All superkeys
- C) All candidate keys
- D) All combinations of all attributes

10. The following E/R diagram describes what kind of relationship between entities E and F?



- A) some E entity examples and all F entity examples are participating in R
- B) every E entity example and all F entity examples are participating in R
- C) every E entity example and not all F entity examples are participating in R
- D) some E entity examples and not all F entity examples are participating in R

Fill the answer to question one in capital letters only

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10

## Question 2: Draw the ER Diagram based on the following (5 points)

A gym wants to build a database to manage members and trainers:

For each **member**, store:

- Member ID (unique)
- Name (first, last) (0.5)
- Age
- Contact

Each member **may** follow multiple **workout plans** and at least one, and each plan **belongs** to exactly one member. (1)

For each **workout plan**:

- Plan ID (unique)
- Goal (e.g., weight loss, muscle gain) multiple goals allowed. (0.5)
- Description
- Exercises (multiple exercises allowed) each exercise has two information (time and machine) (0.5)

For each **trainer**, store:

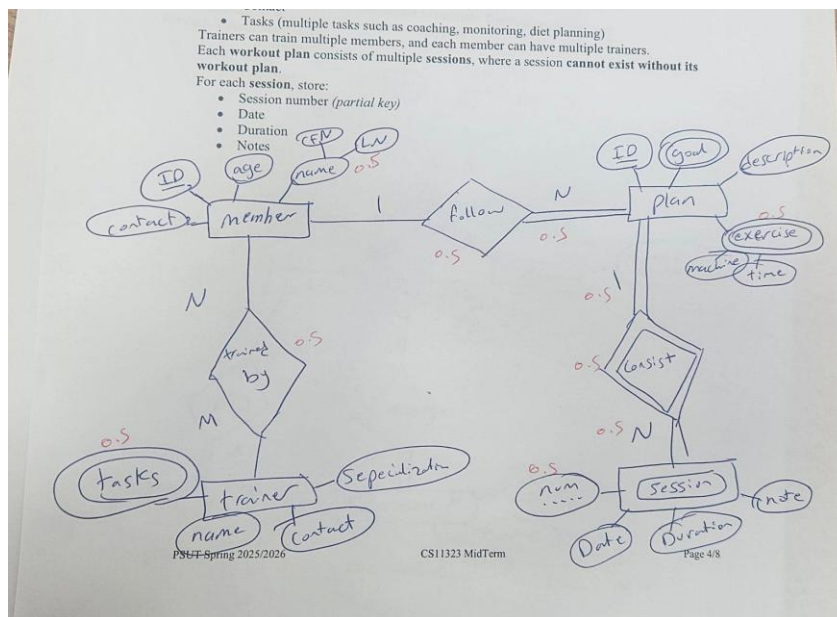
- Name (unique)
- Specialization (e.g., fitness, bodybuilding)
- Contact
- Tasks (multiple tasks such as coaching, monitoring, diet planning) (0.5)

Trainers **can** train multiple members, and each member **can** have multiple trainers. (0.5)

Each **workout plan** **consists** of multiple **sessions**, where a session **cannot exist without its workout plan**. (1.5,, 0.5 total, 0.5 identifying relationship, 0.5 1-N)

For each **session**, store:

- Session number (*partial key*) (0.5)
- Date
- Duration
- Notes



### Question 3: Draw a complete EER diagram (5 points)

A gaming platform stores information about **Players**, each described by: (0.5)

- PlayerID
- Username
- JoinDate

Players are categorized into:

- **CasualPlayer** with PlayTime (0.5)
- **CompetitivePlayer** with Rank (0.5)
- **Streamer** with ChannelName (0.5)

A Player **must** belong to **one or more** of these categories. (1 ,, 0.5 for total, 0.5 for overlap)

1. **Casual Players** can play multiple **Games**, and each game must be played by many casual players. (0.5)

For each **Game**, store: (0.5)

- GameID (unique)
- Title
- Genre

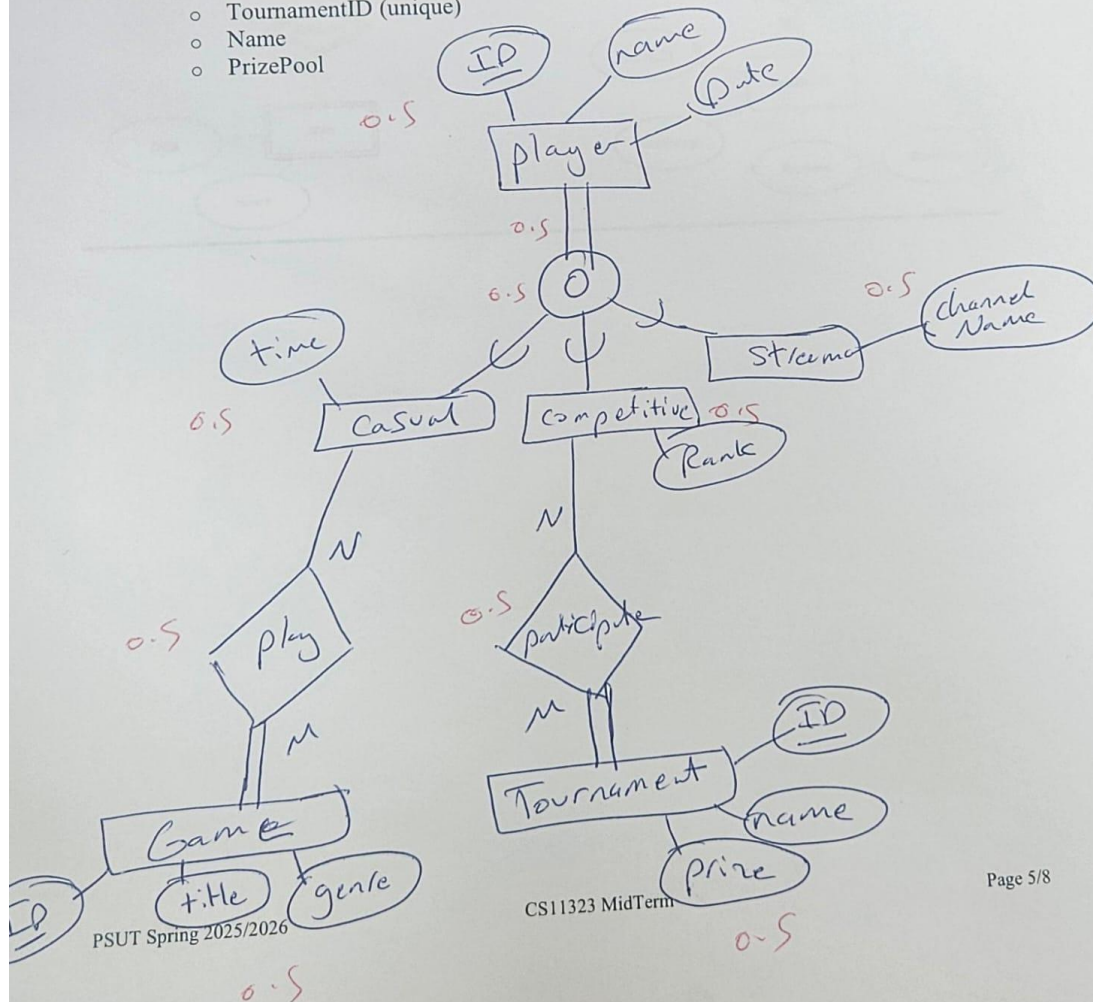
2. **Competitive Players** may participate in multiple **Tournaments**, and each tournament includes many competitive players. (0.5)

For each **Tournament**, store: (0.5)

- TournamentID (unique)
- Name
- PrizePool

tournament includes many competitive players.  
 For each **Tournament**, store:

- TournamentID (unique)
- Name
- PrizePool

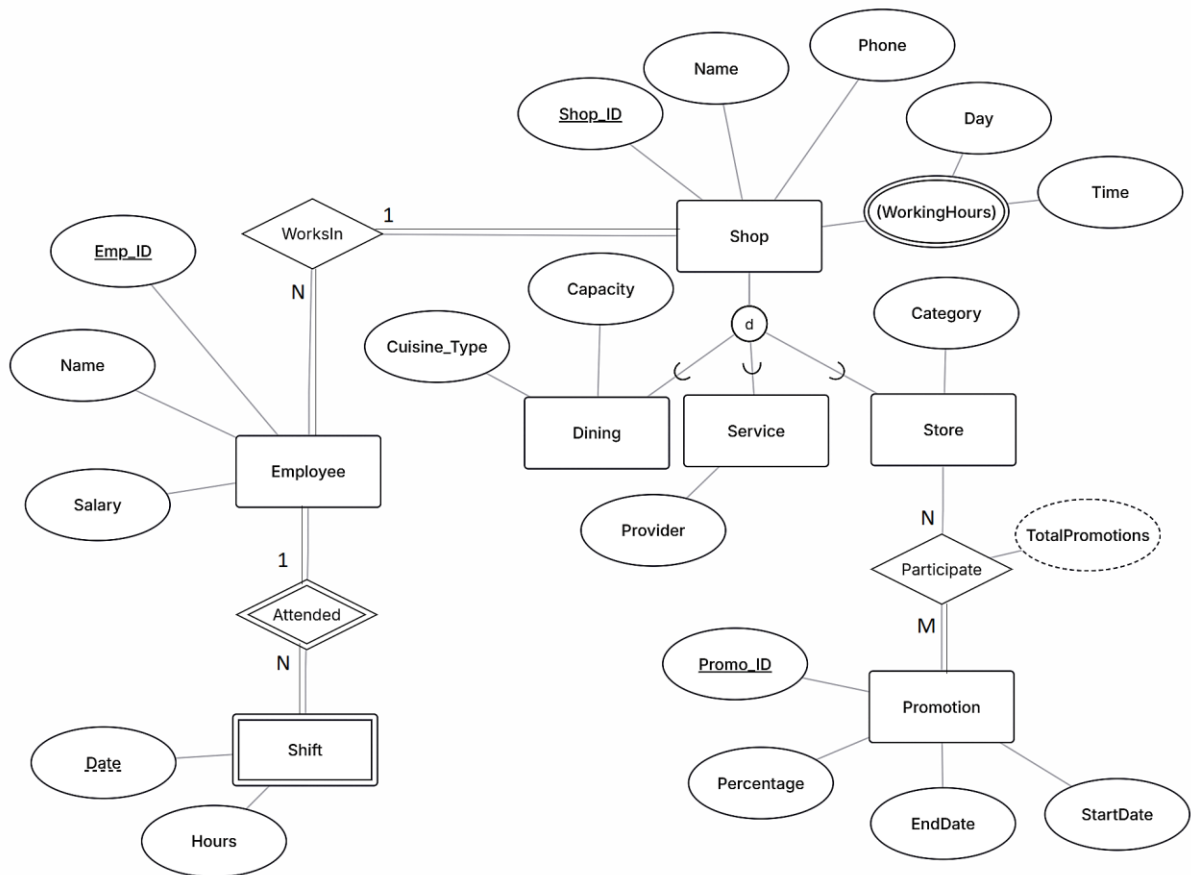


#### Question 4: Mapping ER/ EER into Relational Model

(5 Points)

Map the following ER/EER diagram into a relational schema.

Note: Use **Option A** to map the specialization/generalization.







**Question 5: Relational Model****(5 Points)**

Given the following statements, write which one is acceptable, which one violates relational model constraints, and which explain why?

**Waiter**

<u>WaiterID</u>	Name	Shift	HireDate
1	Ahmad	Morning	2022-01-10
2	Salma	Evening	2023-03-15

**MenuItem**

<u>ItemID</u>	ItemName	Price	Category
10	Burger	6.5	Main
11	Pizza	8.0	Main
13	Salad	4.0	Starter

**Order**

<u>OrderID</u>	WaiterID (FK)	OrderDate
100	1	2026-04-10
101	2	2026-04-10
102	1	2026-04-11

**OrderItem**

<u>OrderID (FK)</u>	<u>ItemID (FK)</u>	Quantity
100	10	1
100	12	2
101	11	1
102	10	1

Statement	Acceptable? (Yes/No)	Constraint violated (if any)
Delete from the MenuItem table the row having ItemName= Pizza	NO	FK
Insert the following values into the Order table <100, 1, 2-2-2026 >	NO	PK
Insert the following values into the waiter table < 'Salam', 3, Morning', 3-3-2026>	NO	Domain constraint
Insert the following values into the Order table <200, NULL, NULL>	YES	
Insert the following values into the OrderItem table <220, NULL, NULL>	NO	Entity integrity FK