

BRAC UNIVERSITY
Department of Computer Science and Engineering
Solution and Marking Rubrics

Examination: Midterm
Duration: 1 hr

Semester: Fall 23
Full Marks: 25

CSE 370: Database Systems

Answer **ALL** of the following questions.

Understanding the question is part of the exam, so **DO NOT** ask questions and answer to the best of your understanding.

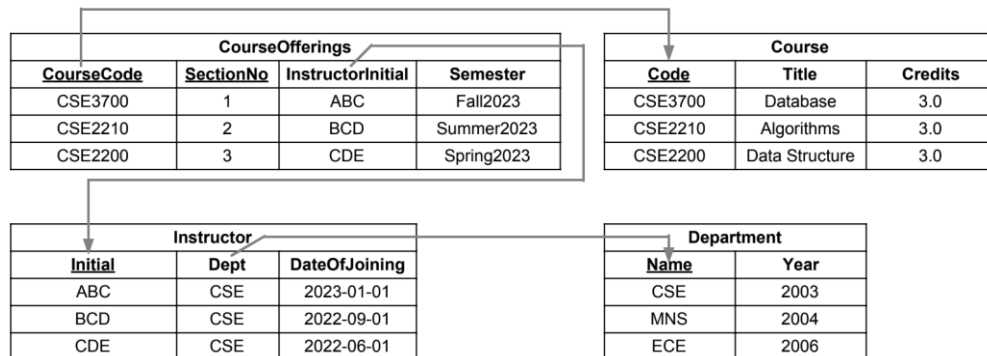
Figures in the right margin indicate marks.

Please Note, the question and rubrics are only an example. Marking may vary slightly from question to question and also every scenario for mark deduction may not be possible to mention in the rubrics. However, similar questions will be graded in a similar fashion.

1. CO1

Consider the database state below (primary keys are underlined, foreign keys are shown using arrows):

5



If the operation below is executed, **identify** all constraints that will be violated and **explain** how you can enforce these constraints to ensure no violation occurs.

Operation : Insert the values <'CSE1110', NULL, 'ABC', 2023> in the CourseOfferings table.

Solution:

'CSE1110' violates Referential Integrity. It can be enforced by declaring the CourseCode column in courseOfferings table as fk that references the Code

column of Course table. NULL violates Entity Integrity, declaring (CourseCode, SectionNo) as the pk of the table will enforce it. 2023 violates Domain Constraints, writing a function that ensures that the Semester values matches a specific String format will help enforce it

Marking Rubric:

Marking may vary slightly from question to question and also every scenario for mark deduction may not be possible to mention in the rubrics

Total Marks = 5

Identify 3 constraint violation correctly : 2.5 marks

- if identifies 2 correctly-> 2 marks,
- 1 correct identification-> 1.5 marks
- for all incorrect identification-> 0 marks

Explain how to enforce 3 constraints: 2.5 marks

- if any identification above was incorrect, but the enforcement explanation for the incorrect identification is correct,-> 0.5 marks for each explanation.
- if 2 explanation is correct, 1 incorrect-> 2 marks (given correct identification
- if 1 explanation is correct (given correct identification) ->1.5 marks.

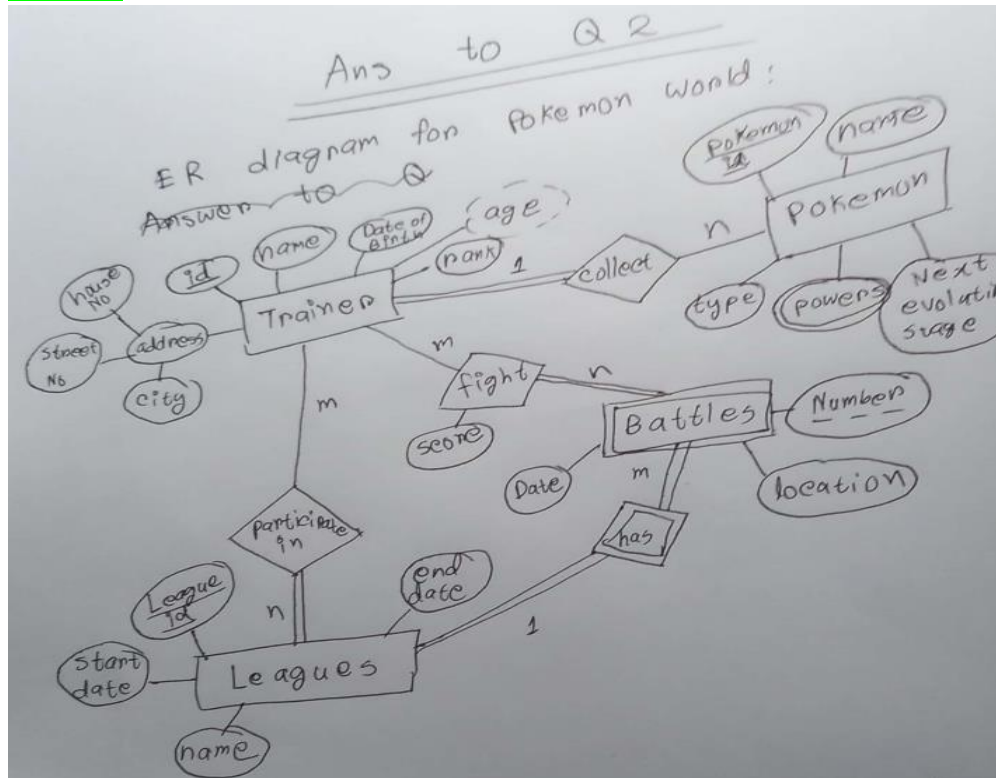
2. CO2

In Pokemon World, Trainers collect magical creatures called pokemons and use them to fight battles against other Trainers to become Pokemon Masters. **Construct** an ER diagram for the Pokemon World according to the data requirements given below: 12

- a. A pokemon has a unique pokemon id, a name, a type, one or more powers and the next evolution stage.
- b. A pokemon trainer has a unique id, name, address which consists of house no., street no. and city., date of birth and rank. The age of a trainer is determined by the given date of birth and the current date, so it is not stored, but should be shown using the appropriate symbol.
- c. Pokemon trainers collect pokemons throughout their journey. Every Pokemon trainer may have many pokemons but a pokemon will have only one trainer. Some pokemons may not have been collected yet.
- d. Trainers participate in Leagues. Each league has a unique Id, start date, end date and league name.
- e. A league has several battles on the same date. A battle has a battle number, location and date. The battle number is a serial number(1, 2, 3...) within the league and the other attributes also will not be unique.
- f. Trainers fight in battles. The score of each trainer in that battle is recorded.

Do not assume any attributes/entities/relationships/multivalued/composite other than the ones mentioned above. For participation constraints/ cardinality ratios, if they are not hinted at in the question, you may assume according to your logical reasoning.

Solution:



Marking Rubric:

Total Marks 12

For each regular entity with correct attributes -> 1 mark, if some attributes are Missing, deduct 0.5 marks

For correct weak entity and partial key -> 1 mark, if partial key missing deduct 0.5, shown as a regular entity deduct full 0.5 mark.

Correct identifying relationship with correct ratio -> 1 mark, if shown as normal relationship deduct 0.5

Normal binary/ternary/recursive relationship with correct ratio and participation constraint- 1 mark each, for multiple incorrect ratio/participation constraint/

Missing relationship attribute deduct 0.5 marks

composite attribute- 1 mark,

multivalued attribute-1 mark,

derived attribute-1 mark

Correct key attributes underlined- 1 mark

If any extra entity type/relationship/multivalued/composite attribute is shown

Deduct 0.5 marks

3. CO2

Design an EER diagram for the University Sports Club. The sports club uses a database system to keep track of its members, advisors, club departments, different sports activities and their results and other club related events.

8

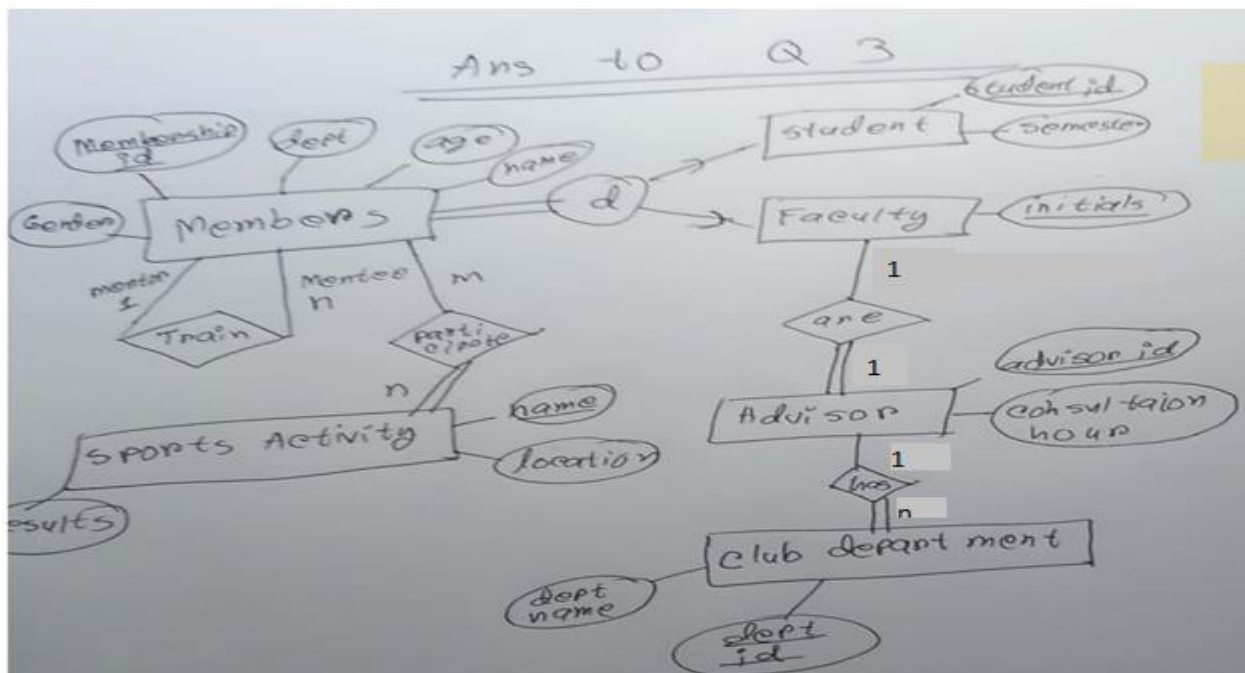
You can design your EER as you wish, but it must satisfy the following constraints:

- there should be at least one disjoint-total specialization/generalization,
- there should be at least four regular entities (excluding the subclasses),
- there must be at least one recursive relationship,
- there must be at least one M:N relationship.

Show the important attributes of all the entities and any relationships required. The EER diagram should be clear and realistic, representing the database of the given scenario.

Solution:

It is a design question, and therefore has no fixed solution. Each student will produce a different solution. However, a POSSIBLE solution is provided below.



Marking Rubric:

Total Marks 8

- 2 marks (1 for disjoint and 1 for total, given correct subclass symbols are used, if subclass symbols i.e. rectangle shape are incorrect, but disjoint total is shown correctly, then deduct 0.5)
- 1 mark

c. 1 mark

d. 1 mark

Complete, logical and realistic diagram -> 3 marks

Strong entity types shown without key attributes deduct 0.5 marks

Entity types shown without any attributes deduct 0.5 marks

Missing ratios/participation constraint deduct 0.5 marks