BRAC UNIVERSITY
Department of Computer Science and Engineering
<mark>Solution and Marking Rubrics</mark>

Examination: Midterm   Semester: Fall 23
Duration: 1 hr   Full Marks: 25

CSE 370: Database Systems

Answer **ALL** of the following questions.
<mark>Understanding the question is part of the exam, so **DO NOT** ask questions and answer to the best of your understanding.</mark>
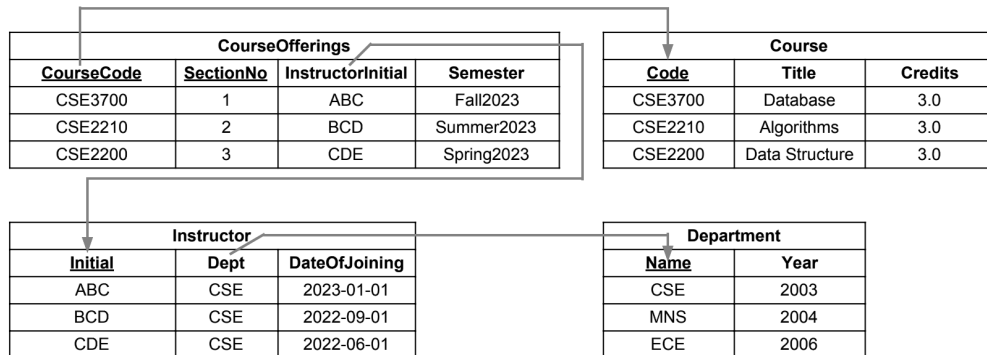
Figures in the right margin indicate marks.

<mark>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.</mark>

1. CO1   Consider the database state below (primary keys are underlined, foreign   5
keys are shown using arrows):

CourseOfferings

CourseCode	SectionNo	InstructorInitial	Semester
CSE3700	1	ABC	Fall2023
CSE2210	2	BCD	Summer2023
CSE2200	3	CDE	Spring2023

Course

Code	Title	Credits
CSE3700	Database	3.0
CSE2210	Algorithms	3.0
CSE2200	Data Structure	3.0

Instructor

Initial	Dept	DateOfJoining
ABC	CSE	2023-01-01
BCD	CSE	2022-09-01
CDE	CSE	2022-06-01

Department

Name	Year
CSE	2003
MNS	2004
ECE	2006

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.

<mark>Solution:</mark>

<mark>'CSE1110' violates Referential Integrity. It can be enforced by declaring the CourseCode column in courseOfferings table as fk that references the Code</mark>
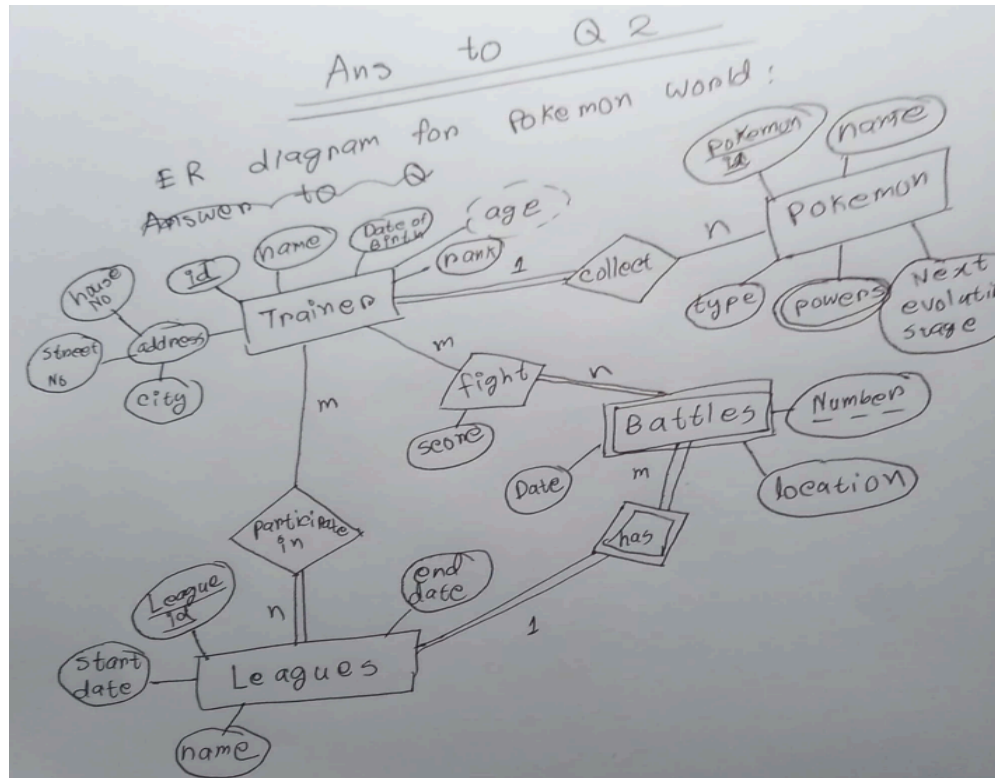
2. CO2 In Pokemon World, Trainers collect magical creatures called pokemons and use them to fight battles against other Trainers to become Pokemon Masters. **Construct** an ER diagram for the Pokemon World according to the data requirements given below: 12

    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.

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   8
uses a database system to keep track of its members, advisors, club
departments, different sports activities and their results and other club
related events.

You can design your EER as you wish, but it must satisfy the following
constraints:
  a. there   should   be   at   least   one   disjoint-total
     specialization/generalization,
  b. there should be at least four regular entities (excluding the
     subclasses),
  c. there must be at least one recursive relationship,
  d. 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.
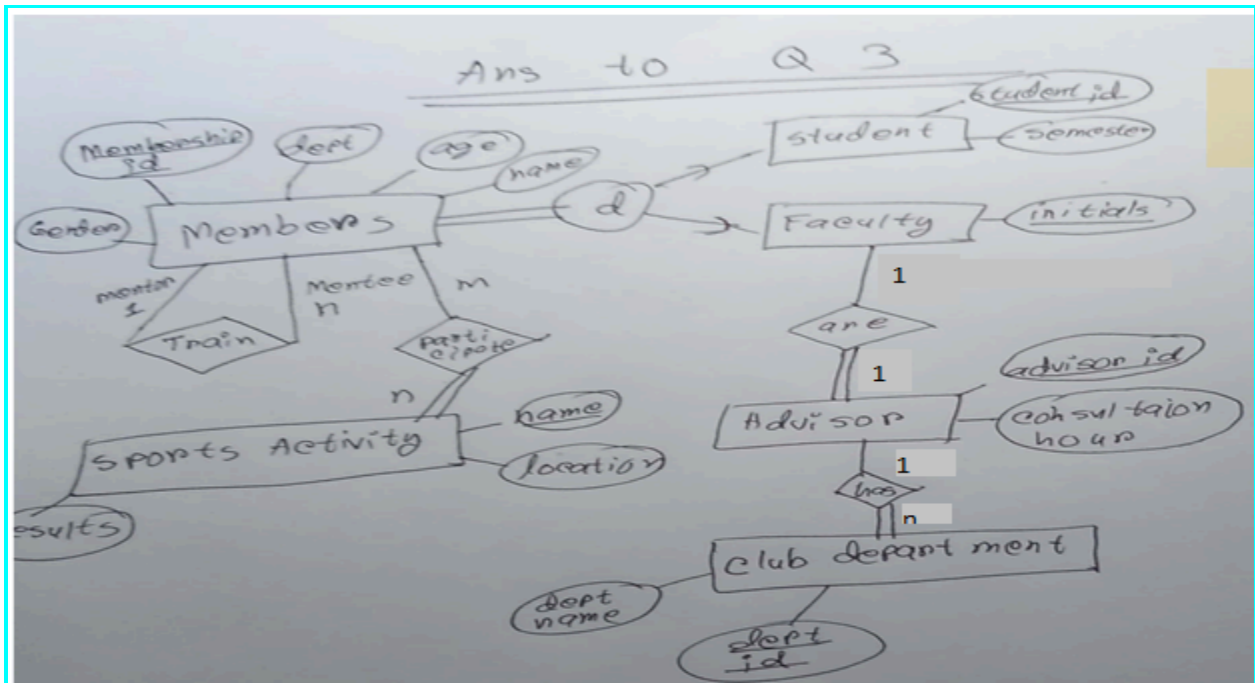
Marking Rubric:
Total Marks 8

     a. **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)
b. **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