

THE OPEN UNIVERSITY OF SRI LANKA
 DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE
 B.Sc. DEGREE PROGRAMME : LEVEL 05
 FINAL EXAMINATION- 2013 / 2014
 CSU3278: DATABASE MANAGEMENT SYSTEMS



DURATION: THREE HOURS (3 Hours)

Date: 15 - 11 - 2014

Time: 09.30 a.m - 12.30 p.m

Answer FOUR (4) Questions ONLY.

QUESTION 01

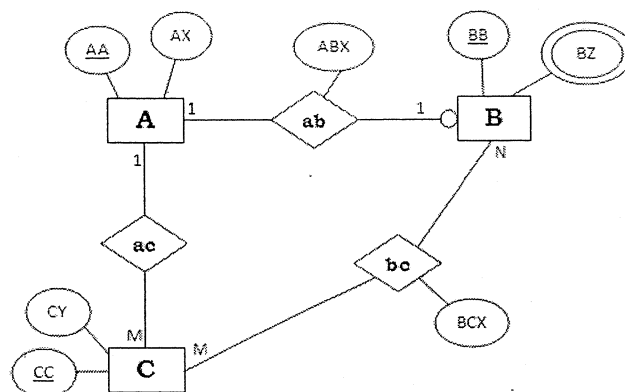
1. Fill in the blanks with suitable words.
 - (a) Unprocessed facts are known as _____.
 - (b) The issue of having same data in different places is _____.
 - (c) Three entities connected to a single relationship is a _____ relationship.
 - (d) A Database can be defined as a collection of _____ data.
 - (e) Processed data are known as _____.
2. What is a database management system? Explain and give one example.
3. State 2 advantages and disadvantages of Database Management Systems.
4. What are the two types of **participation** of a relationship that can be found in the Entity Relationship Model. Give the definition and then show the ER notation with suitable examples for each.
5. "A Lecturer may teach students. Maximum number of students taught by a lecturer is 100. A student must be taught by one and only one lecturer."
 Using Chen notation, draw the Entity Relationship Diagram for this description. Show connectivity, cardinality and participation of the relationship properly.

QUESTION 02

1. Name 3 components that can be found in the database system environment.
2. What is a single user database?
3. What is meant by a 'Foreign Key'? Explain your answer using a suitable example.
4. State whether the following statements are true or false. If false, give reasons.
 - (a) A primary key allows us to uniquely identify a record in a table in the relational model.
 - (b) A table in the relational model is equivalent to an attribute in the entity relationship model.

- (c) A primary key can allow NULL values.
- (d) If an attribute can have more than one value at a time, it is a composite attribute.
- (e) When we connect 2 or 3 attributes together to create a primary key, it is known as a composite key.
- (f) If an attribute can further divide in to sub attributes, then it is a multivalued attribute.

5. Look at the following ER Diagram.



Draw the appropriate Relational Schema for the given ERD.

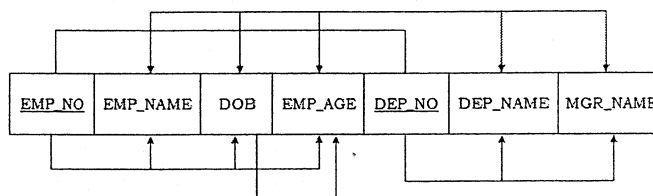
QUESTION 03

1. Read the following scenario carefully.

A game making company allows players to play their games for testing purpose. Each player has an ID to identify them. Apart from that, they keep the name and the contact number of a player. A player may have several contact numbers. A player **must** play only one game and each game **may be** played by several players. There can be games that have been played by no player yet. A game has its own ID to identify each, a name and a completed date. A game has at least one level. Maximum number of levels a game should have is restricted to 10. A level has an ID for its identification and a name.

- (a) To draw the ER Diagram, identify Entities and their attributes. Draw each entity with its attributes using the ER notation (Use Chen notation). When drawing, use standard naming conventions you learned.
- (b) Draw the complete ER diagram with proper relationships.
- You do not need to show all the attributes of an Entity (Because you showed them in part (a)). Show only the primary key of each Entity.
 - Show the proper connectivities of the relationships.
 - Show the cardinalities of each entity with each relationship.
 - Represent the relationship's participation as optional or mandatory.
 - Use standard Chen notation to draw the ER Diagram.

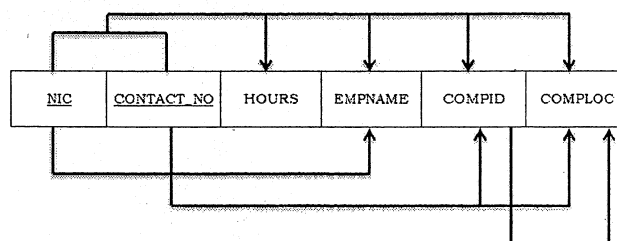
2. Look at the following dependency diagram.



- What is a Partial Dependency? Identify partial dependencies in the diagram and mark them.
- What is a Transitive Dependency? Identify transitive dependencies in the diagram and mark them.

QUESTION 04

1. Look at the following dependency diagram.



- What is the Normal form that this table currently in? Justify your answer.
 - Clearly show the steps you follow to normalize this table into the third normal form (3NF). Mark the primary keys of each decomposed table.
- State two disadvantages of the entity relationship data model.
 - Read the following description about Kasun's book library database.

Kasun has a mini library in his home.

His friends like to borrow his books, and he needs a way to keep track of who has what. He maintains a list of friends, identified by unique FID's (friend identifiers) and a list of books, identified by BOOKID's (BOOK identifiers). With each friend, he keeps the name and the all important telephone numbers which he can call to get the book back.

A book has a name and a category. **Whenever a friend borrows a book**, Kasun will enter that fact into his database along with the **date borrowed**. Whenever the Book gets returned, that fact, too, gets noted along with the **date returned**.

He **does not keep** information about the friends who does not borrow books. But, he has books which has **not yet borrowed** by any of his friends.

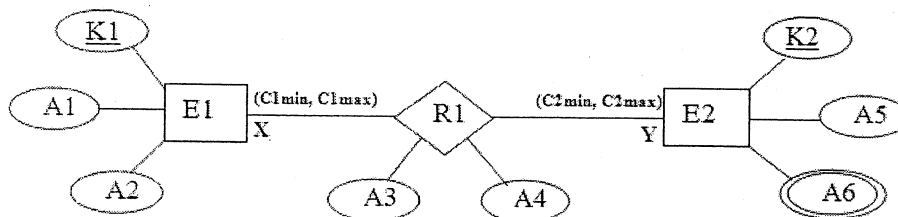
Kasun wants to keep a complete history of his friends' borrowing habits, so that he

can ask favors of the heavy borrowers (or perhaps refuse to make further loans to those who habitually don't return them quickly)

(a) Below is an E-R diagram for a database to help Kasun.

Identify primary keys **K1** and **K2** correctly.

Provide appropriate names for entities **E1**, **E2**; attributes **A1**, **A2**, ..., **A5**; multi-valued attribute **A6**, relationship **R1**, connectivities **X**, **Y** and cardinality constraints **C1min**, **C1max**, **C2min** and **C2max**.



- i. Entity E1 :____ ii. Key K1 :____ iii. Attribute A1 :____ iv. Attribute A2 :____
 v. Entity E2 :____ vi. Key K2 :____ vii. Attribute A5 :____
 viii. Multi-valued Attribute A6 :____ ix. Relationship R1:____ x. Attribute A3 :____
 xi. Attribute A4 :____ xii. Connectivity X:____ xiii. Connectivity Y:____
 xiv. Cardinality C1min:____ C1max :____ xv. Cardinality C2min:____ C2max :____

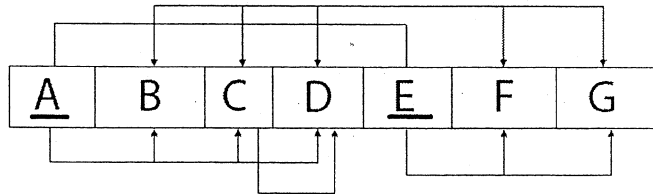
(b) Draw the appropriate Relational Schema for the ERD.

QUESTION 05

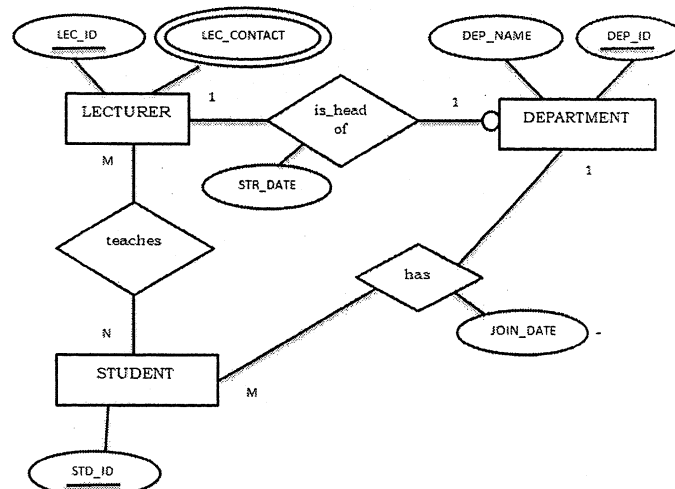
- What are the 3 types of relationships we can find in the entity relationship model? Explain each of them with suitable examples.
- State 2 disadvantages in the hierarchical database model and explain them briefly.
- Write equivalent components in the relational model for the following components in the entity relationship model.
 - Entity Set / Entity
 - Entity Occurrence
 - Attribute
- Classify (use one or two lines) database systems according to
 - Number of users
 - Location
 - Expected type and extent of use
- Write short notes on the following terms.
 - Entity
 - Composite Key
 - Database Management Systems
 - Unary Relationship

QUESTION 06

1. Look at the following dependency diagram.



- What is the Normal form that this table currently in?
 - Why do you convert this table in to the second normal form (2NF)?
 - Clearly show the steps you follow to normalize this table into the third normal form (3NF). Mark the primary keys of each decomposed table.
- What are the main steps in the process of database development? Briefly explain.
 - Data redundancy must be controlled. Explain.
 - Look at the following ER Diagram.



Draw the appropriate Relational Schema for the given ERD.

----- All Rights Reserved -----