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MOAAZ SIDDIQ

**CS403- Database Management Systems**  
**Solved Subjective**  
**From Midterm Papers**

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**CS403- Database Management**  
**Systems MIDTERM EXAMINATION**

Question.1 (2 marks)

**Write the two types of Completeness Constrains?**

**Answer:- (Page 103)**

There are two types of completeness constraints, partial completeness constraints and total completeness constraints.

Question.2 (2 marks)

**Define main functionality of subtype discriminator?**

**Answer:- (Page 108)**

This is a tool or a technique which provides us a methodology to determine that to which subtype one instance of a supertype belongs.

Question.3 (2 marks)

**If we have two entities make it one to one relationship?**

**Answer:- [Click here for detail](#)**

**One-to-one relationship**



Question.4 (2 marks)

**what is difference between relation and relationship 2 marks**

**Answer:- [Click here for Detail](#)**

**Relationship** is purely a construct of the er data model.

**Relation** is a structure of the relational data model.

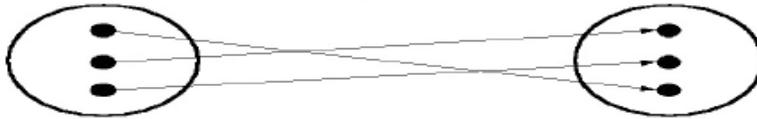
Question.5 (3 marks)

**If we map a unary relationship into relationship and ERD has one to one cardinality then what would be the mapping producer?**

**Answer:- (Page 89)**

○ **One-to-One mapping:**

A mapping  $R$  from  $X$  to  $Y$  is one-to-one if each entity in  $X$  is associated with at most one entity in  $Y$  and vice versa.



**Question.6**

**(3 marks)**

**Make relation b/w two tables with foreign key? With example.**

**Answer:- (Page 133)**

EMP (empId, empName, qual, depId)

DEPT (depId, depName, numEmp)

In this example there are two relations; EMP is having record of employees, whereas DEPT is having record of different departments of an organization. Now in EMP the primary key is empId, whereas in DEPT the primary key is depId. The depId which is primary key of DEPT is also present in EMP so this is a foreign key.

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**What do you know about the cardinalities of relationship? (2 Marks)**

**Answer:- (Page 89)**

The cardinality of a relationship is the number of entities to which another entity can map under that relationship.

**What is Data type? (2 Marks)**

**Answer:- (Page 197)**

In Microsoft SQL Server™, each column, local variable, expression, and parameter has a related data type, which is an attribute that specifies the type of data (integer, character, money, and so on) that the object can hold.

**How to implement one-to-one relationship while designing tables? (3 Marks)**

**Answer:- (Page 143)**

In this relationship primary key of one entity type has to be included on other as foreign key. One-to-Many relationships are implemented by splitting the data into two tables with primary key and foreign key relationships.

**Name the three different kinds of anomalies which can be eliminated through normalization? (3 Marks)**

**Answer:- (Page 170)**

- Insertion Anomaly
- Deletion Anomaly
- Updating Anomaly

**Shortly describe procedural DML and Non-procedural DML. Also give their alternate names. (5 Marks)**

**Answer:- (Page 208)**

There are two types of DML. First is procedural in which: the user specifies what data is needed and how to get it. Second is nonprocedural in which the user only specifies what data is needed.

**What is a functional dependency F said to be minimal? (5 Marks).....**

**Answer:- (Page 165)**

A minimal super key is the candidate key, so if a determinant of functional dependency determines all attributes of that relation then it is definitely a super key and if there is no other functional dependency

## **CS403- Database Management Systems MIDTERM EXAMINATION**

**Q21:-what do you know about partial dependency? (2)**

**Answer:- [Click here for Detail](#)**

A partial dependency is a dependency where A is functionally dependant on B ( $A \rightarrow B$ ), but there is some attribute on A that can be removed from A and yet the dependency stills holds.

**Q22:-Define domain of an attribute? (2)**

**Answer:- (Page 75)**

Domain is the set of possible values that an attribute can have, that is, we specify a set of values either in the form of a range or some discrete values, and then attribute can have value out of those values.

**Q23:-Define relationship type? (3)**

**Answer:- (Page 85)**

A relationship type is an abstraction of a relationship i.e. a set of relationships instances sharing common attributes.

**Q24:-Describe shortly “the difference Operation “in relational algebra? (3)**

**Answer:- (Page 154)**

If R and S are two relations which are union compatible then difference of these two relations will be set of tuples that appear in R but do not appear in S. It is denoted by (-).

**Q25:-Explain the salient features of foreign key with help of example? (5)**

**Answer:- [Click here for detail](#)**

A foreign key is a mechanism in a relational database that allows for the association of those tables, or for the tables to have a relationship with one another. There are unique characteristics that a foreign key must have.

A foreign key guarantees that rows in one table correspond to rows in some other table, thereby establishing database-wide relationships, or references. The table containing the foreign key is the "child," and the other table is the "parent."

**Foreign Key Example:-**

Faculty (Fac\_Id, department, rank, name)

Class (Class\_No, Fac\_Id, Schedule, room)

Fac\_Id is the foreign key in Class Relation as it is primary key in other Relation Faculty.

According to definition An attribute of a table B that is primary key in another table A is called as foreign key

**Q26:-Consider the relation R with four attributes A,B,C and D and the functional dependencies (A,B)->(C,D) and C->D**

**a). The above relation is normalized relation upto which normal form.**

**b).Write the PK of relation R. (5)**

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**Q1-What do you know about the cardinalities of relationship? marks 2**

**Answer:- (Page 189)**

The cardinality of a relationship is the number of entities to which another entity can map under that relationship.

**Q2-What is the “data type”? marks 2**

**Answer:- (Page 76)**

Data type is defined as a set of values along with the operations that can be performed on those values. Some common data types are Integer, Float, Varchar, Char, String, etc.

**Q3-What is the basic function of a DML Compiler? marks 3**

**Answer:- [Click here for detail](#)**

DML Compiler translates DML statements in a query language or we say into low-level instruction. That instruction is understandable by Query evaluation engine.

**Q4-Define the first normal form. marks 3**

**Answer:- (Page 167)**

A relation is in first normal form if and only if every attribute is single valued for each tuple. This means that each attribute in each row, or each cell of the table, contains only one value. No repeating fields or groups are allowed.

**Q5-Write any 5 properties of the Relational tables? marks 5**

**Answer:- (Page 128)**

- Each cell of a table contains atomic/single value
- Each column has a distinct name; the name of the attribute it represents
- The values of the attributes come from the same domain
- The order of the columns is immaterial
- Each row/tuple/record is distinct, no two rows can be same

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**Give at least 02 benefits of Normalization (02 Marks)**

**Answer:-** [Click here for Detail](#)

- ❖ Searching, sorting, and creating indexes is faster, since tables are narrower, and more rows are fit on a data page.
- ❖ More tables allow better use of segments to control physical placement of data.

**What is Data Definition Language (DDL)? (02 Marks)**

**Answer:-** [Click here for Detail](#)

Data Definition Language (DDL) describes the portion of SQL that allows you to create, alter, and destroy database objects.

**What is data type? (02 Marks)**

**Answer:-** rep

**Describe with example Referential integrity constraints (03 Marks)**

**Answer:-** (Page 68)

These are the rules which ensure the correctness of data in the database and maintain the database in usable state so that correct information is portrayed in designing the database. Generally these components are not explicitly defined in data models, they may be available in some of the modern DBMSs but in traditional and general model, these may not be available.

**Describe functional dependency (03 Marks)**

**Answer:-** rep

**Describe with example function of Union Operation in relational algebra (05 Marks)**

**Answer:-** (Page )

It is denoted by U. If R and S are two relations, which are union compatible, if we take union of these two relations then the resulting relation would be the set of tuples either in R or S or both. Since it is set so there are no duplicate tuples. The union operator is commutative which means: -

$$R \cup S = S \cup R$$

For Example there are two relations COURSE1 and COURSE2 denoting the two tables storing the courses being offered at different campuses of an institute? Now if we want to know exactly what courses are being offered at both the campuses then we will take the union of two tables:

**COURSE1**

crId	progId	credHrs	courseTitle
C2345	P1245	3	Operating Sytems
C3456	P1245	4	Database Systems
C4567	P9873	4	Financial Management
C5678	P9873	3	Money & Capital Market

**COURSE2**

crId	progId	credHrs	courseTitle
C4567	P9873	4	Financial Management
C8944	P4567	4	Electronics

**COURSE1 U COURSE2**

crId	progId	credHrs	courseTitle
C2345	P1245	3	Operating Sytems
C3456	P1245	4	Database Systems
C4567	P9873	4	Financial Management
C5678	P9873	3	Money & Capital Market
C8944	P4567	4	Electronics

Two tables and output of union operation on those tables

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**Question No: 17 ( Marks: 2 )**

For which purpose do we use relational data model?

**Answer:- (Page 126)**

The RDM is mainly used for designing/defining external and conceptual schemas; however to some extent physical schema is also specified in it.

**Question No: 18 ( Marks: 2 )**

What major problem can occur if we do not normalize a relation into the first normal form?

**Question No: 19 ( Marks: 2 )**

In which situation do a recursive relationship exist?

**Answer:- (Page 95)**

This is the situation when any attribute of one entity is associated with another attribute of the same entity.

**Question No: 20 ( Marks: 3 )**

What is DML (Data Manipulation Language)?

**Answer:- (Page 95)**

For using a certain model certain data manipulations are performed using a specific language. This specific language is called data manipulation language.

**Question No: 21 ( Marks: 3 )**

What are the three important objectives for using data types while specifying attributes?

**Answer:- (Page 184)**

- ❖ Minimized usage of storage space
- ❖ Represent all possible values
- ❖ Improve data integrity

**Question No: 22 ( Marks: 5 )**

**Briefly explain super key in relation with primary key.**

**Answer:- (Page 83)**

we can identify two different attributes that can individually identify the entity instances of STUDENT and they are regNo and nIdNumber, both are minimal super keys so both are candidate keys. Now in this situation we have got two candidate keys. The one that we choose will be declared as primary key, other will be the alternate key. Any of the candidate keys can be selected as primary key, it mainly depends on the database designer which choice he/she makes. There are certain things that are generally considered while making this decision, like the candidate key that is shorter, easier to remember, to type and is more meaningful is selected as primary key.

**Question No: 23 ( Marks: 5 )**

When is a functional dependency **F** said to be minimal?

**Answer:- rep**

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**Question No: 17 ( Marks: 2 )**

**What do you know about Insertion anomaly?**

**Answer:-**

Insertion anomaly indicates that we cannot insert a fact about one entity until we have an additional fact about another entity.

**Question No: 18 ( Marks: 2 )**

**Define domain of an attribute.**

**Answer:- rep**

**Question No: 19 ( Marks: 2 )**



Data Flow

**Label the following diagram**

1...

2...

**Answer:- (Page 57)**

1... Data Store

2...External entity

**Question No: 20 ( Marks: 3 )**

**Why do the relational data model considered as simple?**

**Answer:- (Page 125)**

There is just one structure and that is a relation or a table. Even this single structure is very easy to understand, so a user of even of a moderate genius can understand it easily.

**Question No: 21 ( Marks: 3 )**

**What is the intersection operation in relational algebra?**

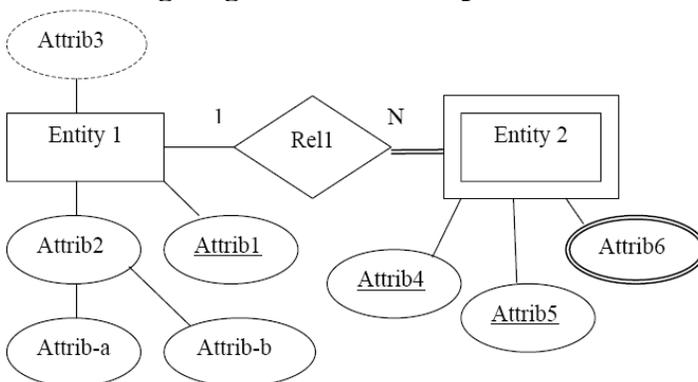
**Answer:- (Page 154)**

The intersection operation also has the requirement that both the relations should be union compatible, which means they are of same degree and same domains. It is represented by  $\cap$ . If R and S are two relations and we take intersection of these two relations then the resulting relation would be the set of tuples, which are in both R and S. Just like union intersection is also commutative.

$$\mathbf{R \cap S = S \cap R}$$

**Question No: 22 ( Marks: 5 )**

**The following diagram describes a part of an ER diagram.**



Considering the above diagram, which of the given statements are True and which are False.

**Answer:-** [Click here for detail](#)

i-Entity2 is a weak entity. **True**

ii-Cardinality ratio for Entity1:Entity2 in Rel1 is 1:N. **True**

iii-Attrib6 represents an attribute which is having composite nature. **False**

iv-Attrib3 is a kind of a derived attributes. **True**

v-Entity2 is participating totally in the Rel1 relationship. **True**

**Question No: 23 ( Marks: 5 )**

**How to implement one-to-many relationship while designing tables?**

**Answer:-** rep

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**Question No: 17 ( Marks: 2 )**

**If there is one super type and there are three subtypes, then how many relations should be created?**

**Answer:-** [Click here for detail](#)

If there is one super type and there are three subtypes, so then four relations are to be created.

**Question No: 18 ( Marks: 2 )**

**Name the two types of unary operations on relational algebra.**

**Answer:-** (Page 148)

Select and Project

**Question No: 19 ( Marks: 2 )**



**Label the following diagram**

1...

2...

**Answer:-** rep

**Question No: 20 ( Marks: 3 )**

**What is DML (Data Manipulation Language)?**

**Answer:-** rep

**Question No: 21 ( Marks: 3 )**

“Student CGPA (StdCGPA) is identified through student name (StdName)” Represent the above statement into the functional dependency (FD) notation.

**Answer:- (Page 165)**

STDUDENT (stdName,stdCGPA)

stName→stdCGPA

**Question No: 22 ( Marks: 5 )**

Name the four basic operations (base operations) in relational algebra.

**Answer:- (Page 148)**

- ❖ SELECT
- ❖ PROJECT
- ❖ UNION
- ❖ SET DIFFERENCE
- ❖ CARTESIAN PRODUCT

**Question No: 23 ( Marks: 5 )**

**Differentiate Total and Partial Completeness Constraints.**

**Answer: (Page 103)**

**Total Completeness constraint:**

Total Completeness constraint exist only if we have a super type and some subtypes associated with that supertype, and the following situation exists between the super type and subtype. All the instances of the supertype entity must be present in at one of the subtype entities, i.e.—there should be not instance of the supertype entity which does not belong to any of the subtype entity.

**Partial Completeness Constraint:** This type of completeness constraint exists when it is not necessary for any supertype entity to have its entire instance set to be associated with any of the subtype entity. This type of situation exists when we do not identify all subtype entities associated with a supertype entity, or ignore any subtype entity due to less importance of least usage in a specific scenario.

## **MIDTERM EXAMINATION**

### **CS403- Database Management Systems**

**Q- What is the significance of normalization?**

**Answer: (Page 168)**

Normalization is basically; a process of efficiently organizing data in a database. There are two goals of the normalization process: eliminate redundant data (for example, storing the same data in more than one table) and ensure data dependencies make sense (only storing related data in a table).

**Q- Define Relationship.**

**Answer:- rep**

**Q- What is the basic function of a DML Compiler?**

**Answer:- rep**

**Q- Define primary key and give one example.**

**Answer: (Page 82)**

A candidate key chosen by the database designer to act as key is the primary key. An entity type may have more than one candidate keys, in that case the database designer has to designate one of them as primary key, since there is always only a single primary key in an entity type. The primary key can also be defined as the successful candidate key

**For example:**

Roll\_No can be used as a primary key of the entity as it would always be unique.

**Q- What do you know about Insertion anomaly?**

**Answer: (Page 170)**

Suppose we want to insert a course in the table, but this course has not been registered to any student. But we cannot enter the student ID, because no student has registered this course yet. So we can also not insert this course. This is called as insertion anomaly which is wrong state of database

**Q- Define the first normal form.**

**Answer:- rep**

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**Question No: 17( Marks: 2 )**

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**Answer:- rep**

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**Briefly explain super key in relation with primary key.**

**Answer:- rep**

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**When is a functional dependency F said to be minimal?**

**Answer:- rep**

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**Question No: 17 ( M a r k s : 2 )**

**State the two conditions which are imposed on candidate key?**

**Answer: (Page 82)**

There are two conditions for the candidate key

It identifies the entity instances uniquely, as is required in case of super key.

It should be minimum, that is, no proper subset of candidate key is a key.

**Question No: 18 ( M a r k s : 2 )**

**What is the importance of determining minimum cardinality in a relationship while designing database?**

**Answer: (Page 91)**

It is very important to determine the minimum cardinality when designing a database because it defines the way a database system will be implemented.

**Question No: 19 ( M a r k s : 2 )**

**What do you know about Insertion anomaly?**

**Answer:- rep**

**Question No: 20 ( M a r k s : 3 )**

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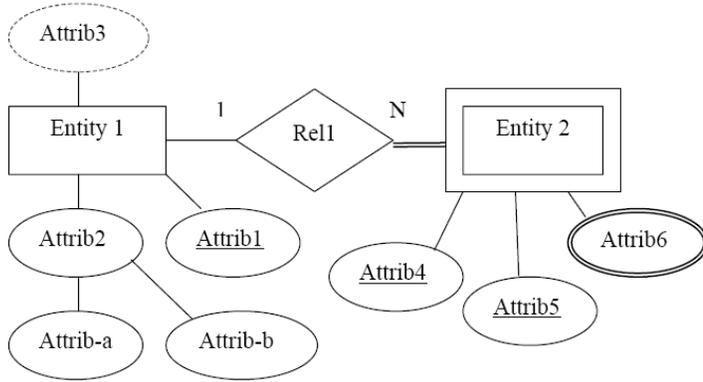
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