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SECTION : A

SEMESTER : 4<sup>th</sup>

CLASS TIMING : FRIDAY (2:00PM-5:00PM)

PAPER : DATABASE SYSTEMS (THEORY)

Q 1:- Which attribute in the following table is a candidate key? Assume that no more data will ever be to this table?

ID	Name	Semester	Department	Cell
1	Sania	1	CS	03334324274
2	Romana	1	CS	03325399183
3	Alina	1	CS	03150034224
4	Ayeza	3	CS	03455559822

ANSWER:-

CANDIDATE KEY:-

Candidate key is a set of attributes that uniquely identify tuples in a table.

Candidate key is a super key with no repeated attributes.

The primary key should be selected from 1 candidate keys.

Every table must have at

least a single candidate key.

A table can have multiple candidate keys but only a single primary key.

## PROPERTIES:-

Candidate key must have the following properties:-

It must contain unique values.

Candidate key may have multiple attributes.

Must not contain null values.

It should contain minimum fields to ensure uniqueness.

Uniquely identify each record in a table.

## EXAMPLE:-

In the given table, students ID and cell are

candidate keys which help us to uniquely identify the student record in the table.

Candidate key

ID	Name	Semester	Department	Cell
1	Sania	1	CS	03334324234
2	Romana	1	CS	03375399123
3	Alina	1	CS	03150034124
4	Ayere	3	CS	02455559822

Q<sub>2</sub>: What is data redundancy and data integrity?

ANSWER:-

DATA REDUNDANCY:-

Data redundancy occurs when the same piece of data is stored in two

or more separate places and is a common occurrence in many businesses. As more companies are moving away from siloed data to using a central repository to store information, they are finding their database is filled with inconsistent duplicates of the same entry.

Although it can be challenging to reconcile - or even benefit from - duplicate data entries, understanding how to reduce and track data redundancy efficiently can help mitigate long-term inconsistency issues for your business.

# ADVANTAGES OF DATA REDUNDANCY:-

## ↳ ALTERNATIVE DATA BACKUP

### METHOD:-

Backing up data involves creating compressed and encrypted versions of data, and storing it in a computer system or the cloud.

Data redundancy offers an extra layer of protection and reinforces the backup by replicating data to an additional system.

## ↳ BETTER DATA SECURITY:-

Data security relates to protecting data, in a database or a file storage system, from

unwanted activities such as cyberattacks or data breaches. Having the same data record or stored in two or more separate places can protect an organization in the event of an cyberattack or breach. An event which can result in lost time and money, as well as a damaged reputation.

↳ FASTER DATA ACCESS AND UPDATES:

When data is redundant, employees enjoy fast access and quick updates because the necessary information is available on multiple systems. This is particularly important for

customer service-based organization whose customers are expecting promptness and efficiency.

#### 4) IMPROVED DATA RELIABILITY:-

Data that is reliable is complete and accurate. Organizations can use data redundancy to double check data and confirm it's correct and completed in full - a necessity when interacting with customers, interacting with vendors, internal staff and other members etc of the organization.



## DISADVANTAGES OF DATA

### REDUNDANCY:

#### ↳ POSSIBLE DATA INCONSISTENCY:-

Data redundancy occurs when the same piece of data exists in multiple places, whereas data inconsistency is when the same data exists in different formats in multiple tables. Unfortunately, data redundancy can cause data inconsistency, which can provide a company with unreliable information.

#### ↳ INCREASE IN DATA CORRUPTION:-

Data redundancy can also cause data corruption. Data

corruption is when data becomes damaged as a result of errors in writing, storage or processing. When the same data fields are repeated in a database, data corruption arises.

If a file gets corrupted, for example, and an employee tries to open it, they may get an error message and not be able to complete their task.

### INCREASE IN DATABASE SIZE:-

Data redundancy may increase the size and complexity of a database - making it more of a challenge to maintain. A larger database can also lead to longer load times and a

great deal of headaches and frustration for employees as they'll need to spend more time completing daily tasks.

↳ INCREASE IN COST:-

When more data is created due to data redundancy, storage costs suddenly increase. This can be a serious issue for organizations who are trying to keep costs low in order to increase profits and meet their goals. In addition, implementing a database system become more expensive. Therefore, data redundancy cause in increase in storage costs.

## DATA INTEGRITY:-

The term data integrity refers to the overall accuracy, completeness and reliability of data. It can be specified by the lack of variation between two instances or consecutive updates of a record, indicating that your information is error-free. It also corresponds to the security of data pertaining to regulatory compliance.

Integrity is preserved by an array of error checking and validation procedure, rules and principles executed during the integration flow designing phase.

## IMPORTANCE:-

The importance of data integrity is also evident when creating relationships between disparate data elements. It ensures that the data transferring from one place to another is error-free and accurate.

## ADVANTAGES OF DATA INTEGRITY:-

- It ensures quality in the product or service.
- It ensures safety and privacy of customers e.g. patients, social media users etc.
- It increases confidence of customers or consumers to use online digital applications and tools.

- This helps to increase businesses in digital economy.
- The data integrity helps to protect data from end to end transfer over transmission medium.
  - Stored procedures can be used used with ease in order to have complete control of data access.

### DISADVANTAGES:

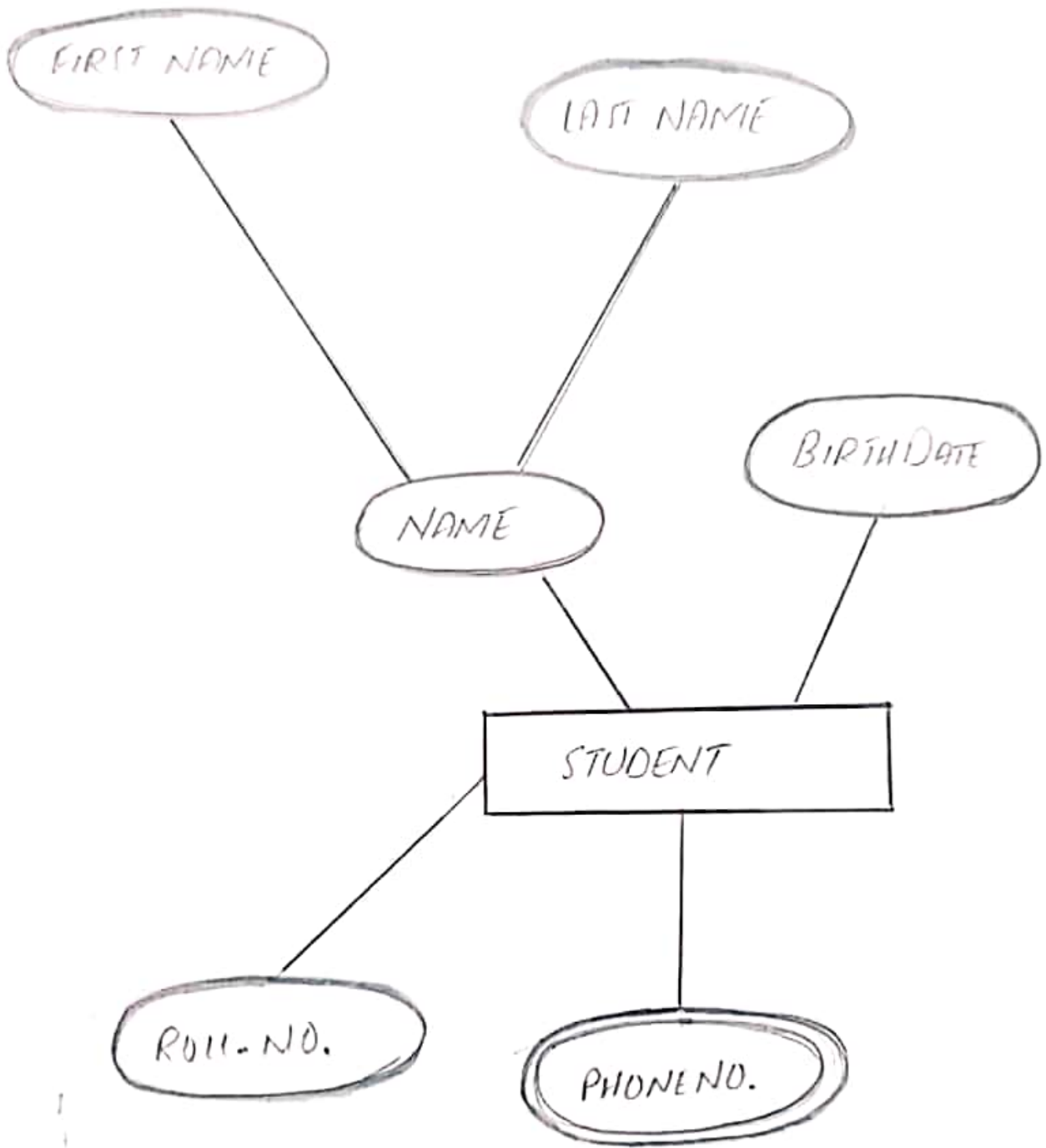
- Data integrity have the following disadvantages
- The DBMS (Database management system) should have capability to reinforce or enforce data integrity for all the applications which use the data.

- It lacks a structural independence  
The programming is complex to implement.
- It is a complex to implement across the entire system due to many new ICT's (information and communication technologies).

Q 3:- How a multivalued composite attribute is represented in Conceptual model? Show with example.

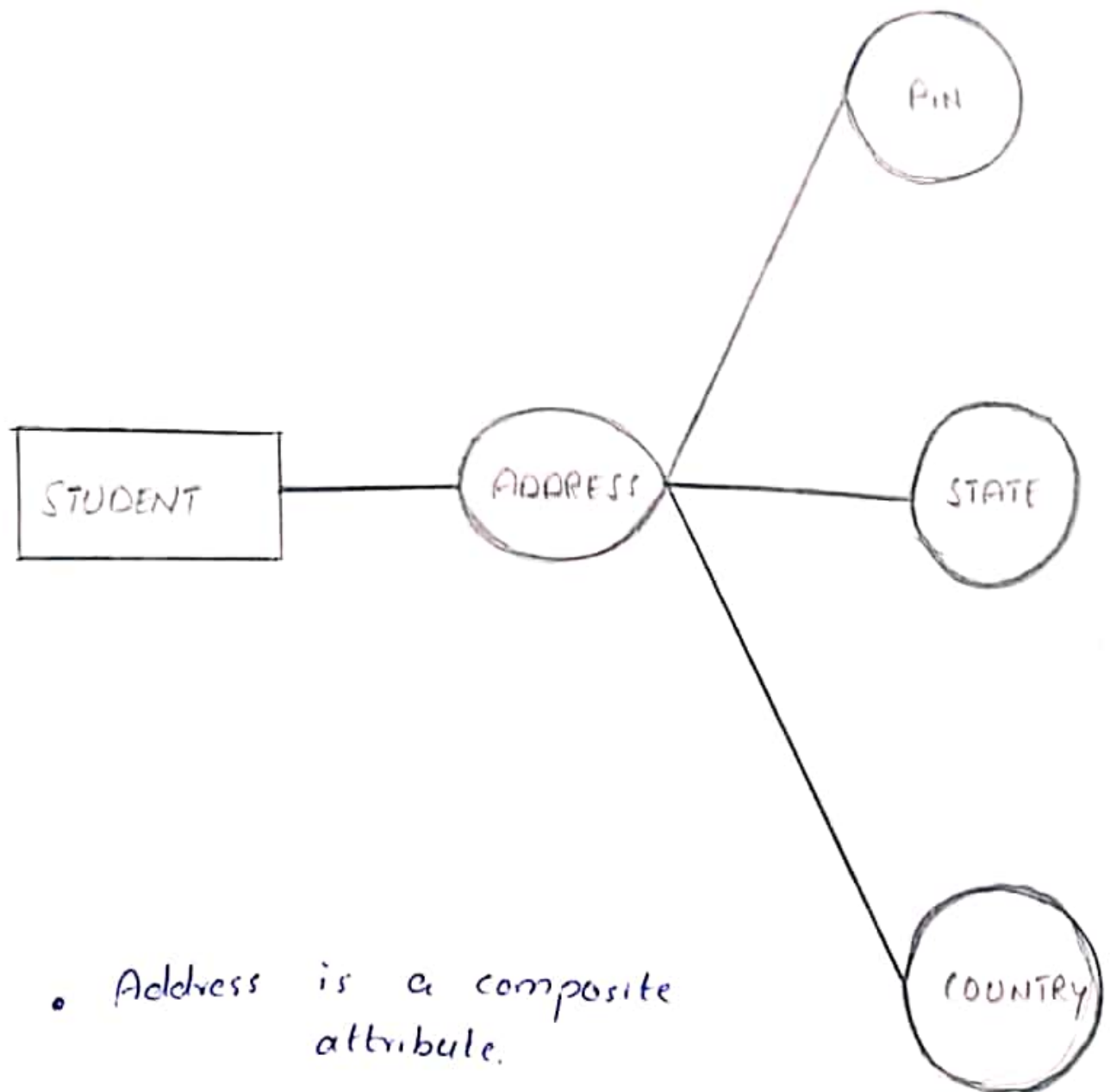
ANSWER:-

An attribute that can hold multiple values is known as multivalued attribute. It is represented with double oval in an ER-diagram. A person can have more than one phone numbers so the phone number is multivalued.

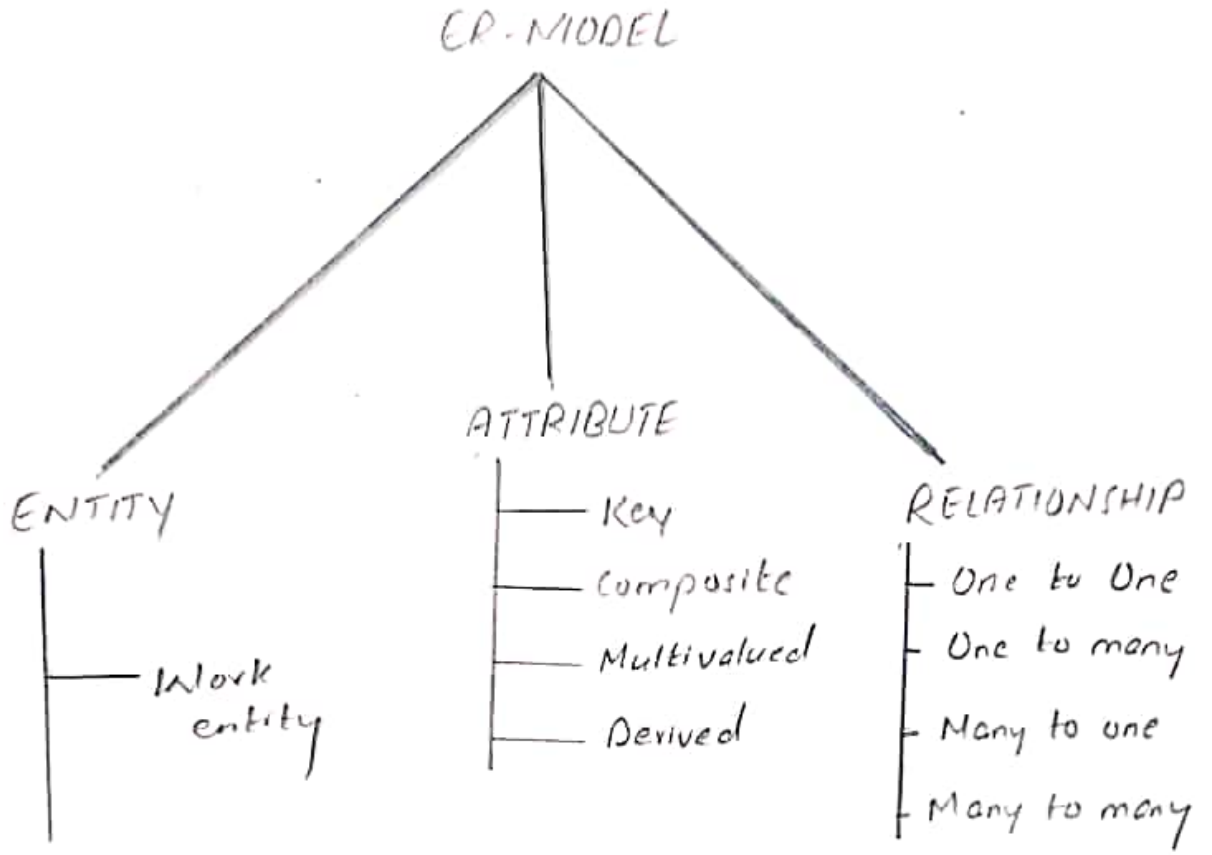




↳ Composite attribute is represented by a Conceptual model.



- Address is a composite attribute.



Q<sub>4</sub>) How's there 'reduced maintenance' in database approach?

ANSWER:-

Database application in a busy corporate setting, yet take considerable over meticulous design, extensive constraints, automated tests, error logs, and defensive coding.

It can cost more to maintain a mature software application in the use than it did to develop it in the first place. To keep an application in use, both developers and DBAs may be forced to spend considerable time on maintenance tasks such as

- Fixing bugs and deploying the fixes
- Changing the functionality because

The requirements have changed.

cleaning up the data

Dealing with concurrency issues,

troubleshooting deadlocks

## SPEEDING UP SLOW QUERIES:-

By the system that we develop then experience many of these problems in production. When our users encounter issues or deal with inconsistent behaviour of the system, it prevents from completing their tasks effectively.

When we have to fix so many problems on top of developing new features, it is bad for our work-life balance.

As a result, unreliable systems may eventually lose both users and developers.

## WRITING MAINTAINABLE CODES:-

If an application is intended to provide a long-term solution, it must be maintainable. To achieve this, it usually makes sense to use development practices that ensure that our system is robust and easy to damageless and change.

This is especially true in Agile environment, here we are always just a few days away from the next release. It is difficult to justify spending a day on the interesting challenge of tuning queries or troubleshooting deadlocks when all the pressure is to concentrate on tomorrow's deployment.

## STEPS TOWARDS MAINTAINING DATABASE MORE MAINTAINABLE:-

I am not going to make any blanket recommendations or hard-and-fast rules - those solutions and approaches that make sense in our environment might be an overkill or just wrong in some other circumstances. Yet I hope that some of the advice in this article might be useful to somebody else -

## INSULATE THE DATABASE BEHIND A WELL ESTABLISHED INTERFACE:

We do not expose tables and views to our users. Instead, we provide an API of stored procedures. This allows us to change the

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the procedures on the underlying tables without the risk of breaking applications. A little bit of extra work needed to wrap a DML statement in a procedure is a highly useful insurance against possible changes.

We decided against exposing views because we want to be able to break a complex query into smaller and simpler parts when needed, storing intermediate result in table variables or temporary tables.

Automate database testing and maintain good test coverage:-

is required of a system of longitivity

that is build on top of an RDBMS, it is essential to have a rigorous harness of automated tests. Our automated tests allow us to dramatically reduce the number of bugs. Also, they enable us to change our system much more easily.

According to Darwin's theory, it is not necessarily the ones who are currently the strongest and the fittest who survive in the long term.

Without automated test harness, it is difficult for RDBMS system to survive by adapting to changing environment.



## DESIGN TABLES DEFENSIVELY:-

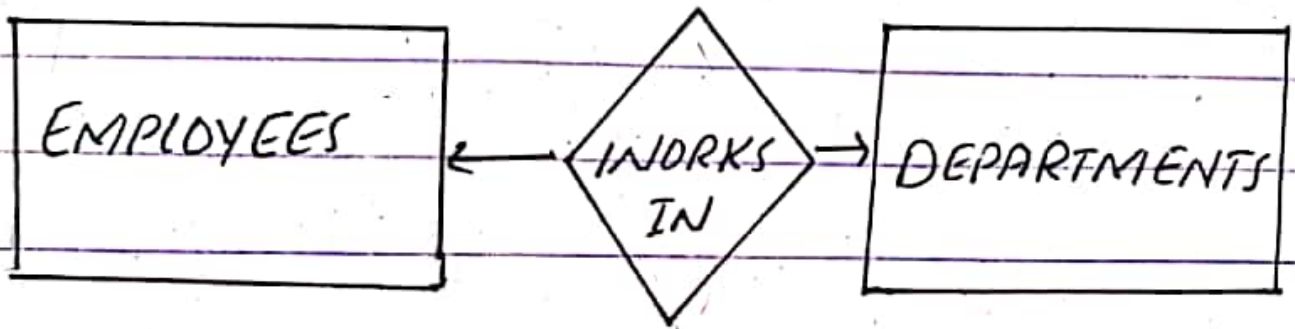
In some cases, it is possible to design tables defensively, so that they are less likely to need change and it is easier to change them when the need comes. Suppose, that right now the following table meets our current needs perfectly well.

Q: How are the following represented using ER Diagram.  
Mandatory one, Mandatory many, optional one, optional many?

### MANDATORY ONE:-

Relationship exists when zero or one instance of

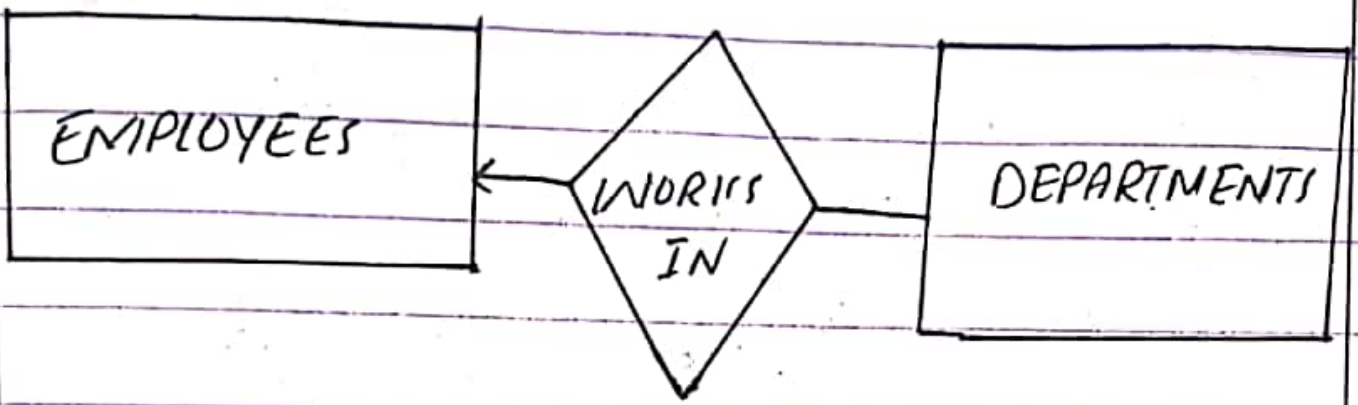
entity A can be associated with zero or one instance of entity B and zero or one instance of entity B is associated with zero or one entity of A instance.



MANDATORY MANY:

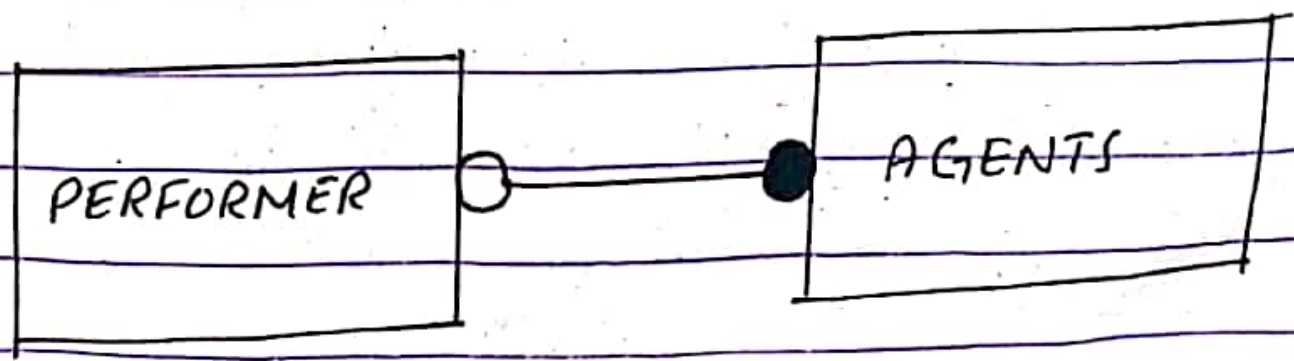
In relational data-base design, a one to many (1:N) relationship exists when, for one instance of entity A, there exists zero or, one, or many instances of entity B, but for one instance of entity B, there exists zero or one

instance of entity A.



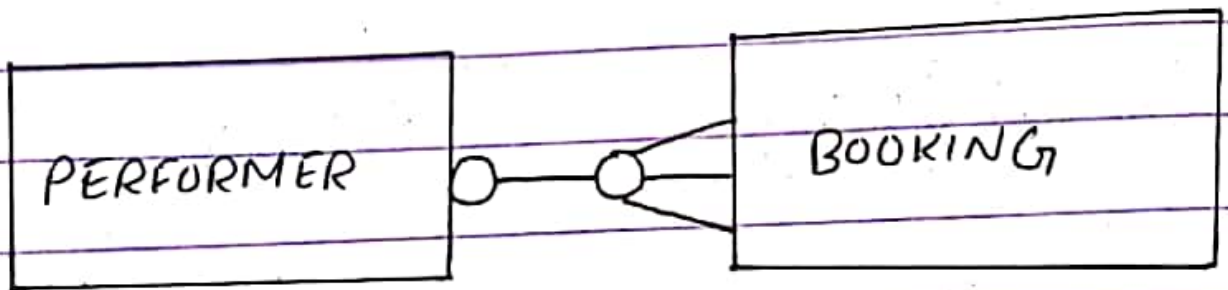
OPTIONAL ONE:-

A member of staff does not have to be placed in a department, but all departments must have at least one member of staff



OPTIONAL MANY:

A performer might have one or more bookings, a booking might be associated with a performer.



In this case a booking could be for an exhibition as it is optional for a booking to involve a performer, as indicated by the hollow circle. A performer might decline to accept any bookings.

Q 6: Why is there an explicit need of backup in database approach?

ANSWER:-

DATABASE BACKUP APPROACH :-

Digital age has putted data on the bussiness functions, cremenling data as one of the most variable assets a bussiness can have. Many businesses have adlapted database software as a mean to manage their data, including functionality to add, edit and remove data as needed. Database particularly excel in data querying, based on the database type, users can search for data using a massive and cutomizable range of parameters to get

back exactly the information they need. They are also often integrated into a variety of business functions.

IMPORTANCE :-

Because the data stored in business database is so important to daily functions. It's imperative that businesses have their database backed up. Equipment failures, data corruption, user error, and other calamities can massively affect both internal users and customers. Database backup software helps ensure that companies always have more copies of their business data. These backups can be scheduled or manually run and they can backup

fully, differentially, incrementally or any combination thereof,

- Backup one or several database types to a chosen destination.
- Setup automated or manual backups at the needed extensiveness.
- Integration with other backup and IT infrastructure and management business solutions.

Responsibility over database typically falls to a company database administrator or i.e.

database team if the company has those kinds of resource so database backup solutions will likely be used most of the those administrator or database team.

## QUESTION # 2

Draw an ERD from the following business rule. Use proper notation for the type of attributes.

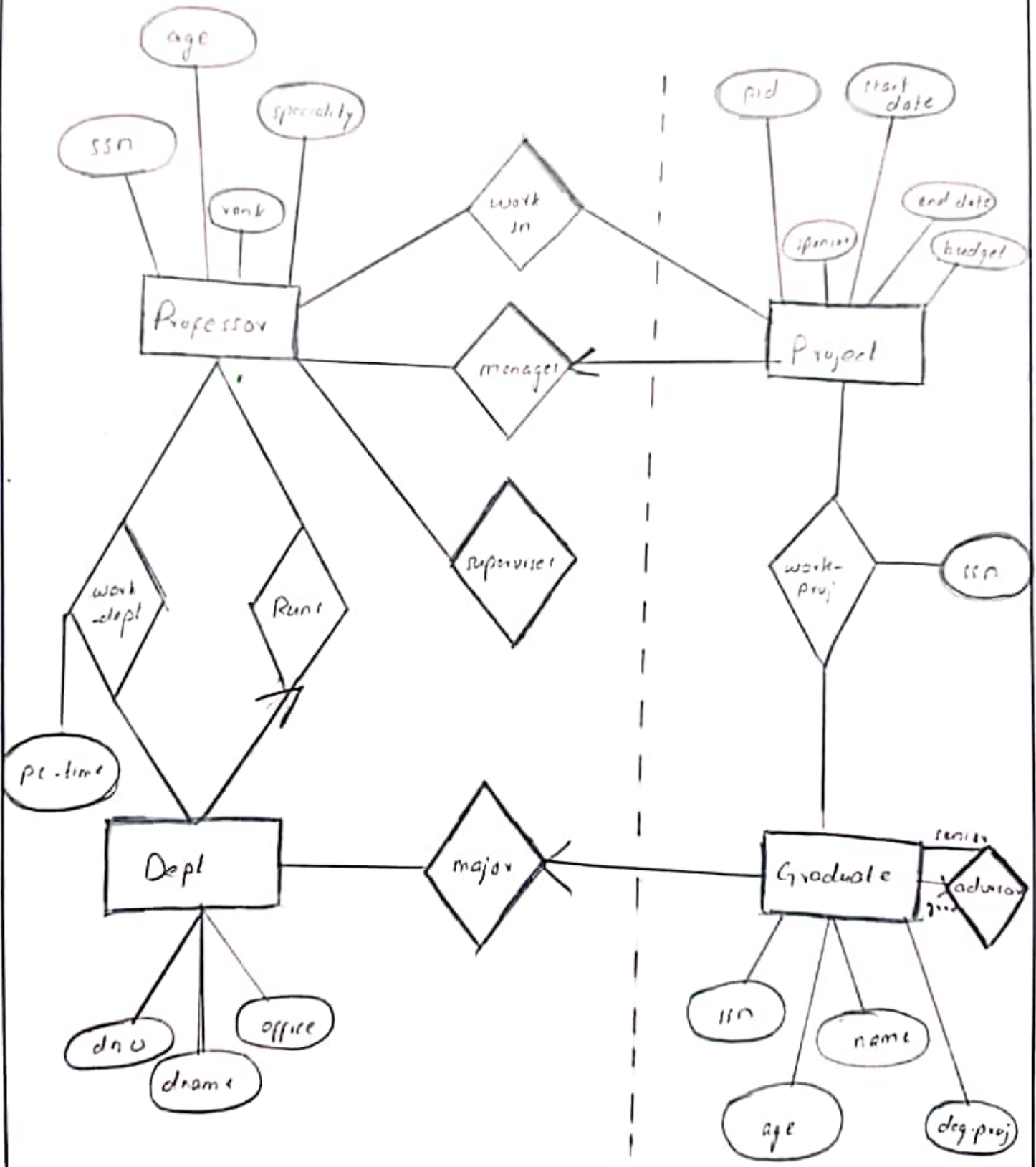
A schema needs to capture all the information that an Art gallery need to maintain. The database shall keep information about Artists, their names, birthplace.

For each piece of art work, the artist, the year it was made, its unique title, its price must be stored.

Pieces of artwork are also classified into groups.



ANSWER:-



## QUESTION # 2

Q Convert the Conceptual model to Relational model.

ANSWER:-

### MAPPING PROCESS:-

- Create table for weak entity test
- Add all its attributes to table as field.
- Add the primary key of identifying entity set.
- Declare all foreign key constraints.

STUDENTS		
STAJD	StdName	StdAddress
1	Zeerhan	Malakand
2	Abubakar	Swal

COURSE	
COURSE NAME	COURSE NUMBER
Bs(se)	se4
Bs (se)	se4

SEAT	
SEAT NUMBER	SEAT POSITION
cc49	6
ee54	10

CLASS		
COURSE NAME	Section no	NUM-REG DATE-TIME
Bs(se)	A	22/10/2018
Bs (se)	B	22/04/2018