1) a) <u>attribute</u> ⇒ A property of description of an entity.

A toy department employee entity could have attributes describing the employee's name, salary and years of service.

b) <u>Domain</u> ⇒ A set of possible values for an attribute.

eg ⇒ if the company rates employees on scale 1 to 10. and store rating in attribute 'Ratings' thus associated domain consists integer 1 throug 10.

c) <u>Entity</u> ⇒ An object in the real world that is distinguishable from other objects such as the Yash Employee, AI & DS department Jio Platform company.

d) <u>Relationship</u> ⇒ An association among two or more entities.

eg ⇒ <u>Amit</u> works in <u>Data Management</u> department employee.

e) <u>Entity set</u> ⇒ A collection of similar entities such as all the ~~toys~~ students in the ~~te~~ AI & DS course.

f) <u>Relationship set</u> ⇒ A collection of similar relationships.

$$\{(e_1, \dots e_n) \nsubseteq (e_1 \in E_1 \dots e_n \in E_n)\}$$

eg ⇒ ~~Enrolled in i~~ e_1 ⇒ customer e_2 ⇒ account. We can define relationship Cust Acct to denote association b/w customer & their accounts

g) <u>One to many Relationship</u>
⇒ A key constraint that indicates that one entity can be be associated with many of another entity.
⇒ An entity in ~~A~~ emp is associated with a most one entity in "Department"

h) <u>Many to many Relationship</u> ⇒ a key constraint that indicates that many of one entity can be associated with many of another entity.

eg ⇒ Students and their hobbies ⇒ A person can have many different hobbies and many people can have same hobbies.

i) **Participation constraint** → It determines whether relationships must involve certain entities.

eg → **Total participation** → Every department entity has a manager.

Partial participation → it says that every employee does not have to be a manager.

→ ≠ ·

j) **weak entity set** → an entity that cannot be identified uniquely without considering some primary key attribute of another identifying owner entity.

eg → including ~~depert~~ dependent information for employees for insurance purposes.

Q2

1) If two X's are completely unrelated, How should the design be improved.?

↳ For this case it does not create any problem for entity set A and B, if only creates u managing relation. But for the ease of understanding, one can change one of the attribute name for A or B.

2) a) X is the primary key for A but not B

↳ In this case as 'x' attribute represent same property to both A & B. we can use foreign key in 'B'

b) X is the primary key for both A and B.

↳ It would be better to combine A and B and make single set of entity. if table has small no. of attributes.

Also to seperate a table which has larger no. of attributes above method is used.

c) x is not the primary key for A nor for B.

⤷ If 'X' is as non key in both relation A & B. there is a high.
change of data redutancy.

But if they both represent same property, they should be
connected either way and unique ..eg as folleign key → B
unique key → A.

Q3 a) we know weak entity set must have total participation in
the identifying relationship set. Also weak entity set
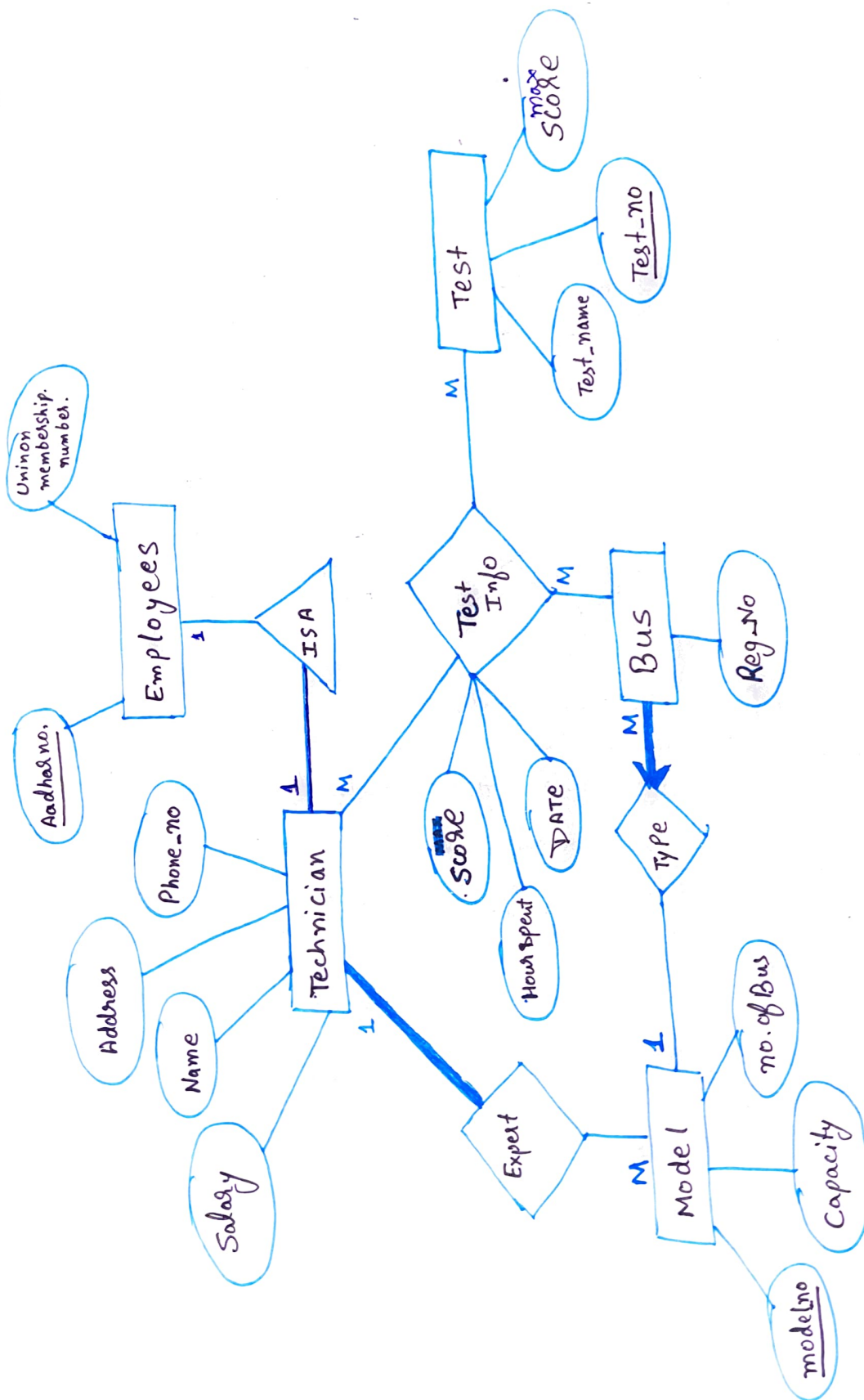must participate in a one to many relationship set.

→ eg
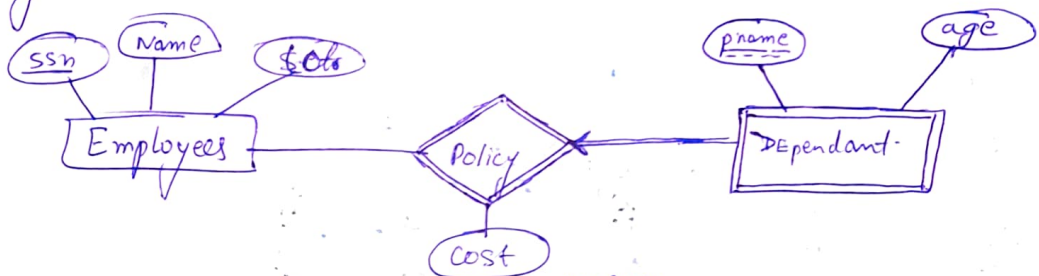
thus ~~Each~~ one employees can have ~~any one~~ dependant
one as many.

eg as AKASH can have one Dependant (His Mother)
and for Yash can have two Dependant (His Mother & Father).

therefore we can say one to one relationship with strong entity but it doesn't
                                 ^
                         weak entity have
make sense all the time due to total participation and
one to many relationship set.

b)

Q4 1)

ER Diagram:

- **Employees** (entity) with attributes: Aadhar no. (key), Uninon membership number.
- **Test** (entity) with attributes: Test_name, Test_no (key), max Score.
- **Test Info** (relationship) connecting Test (M) and Bus (M), with attributes: Score, Hour spent, DATE.
- **ISA** relationship between Employees (1) and Technician (M).
- **Technician** (entity) with attributes: Phone_no, Address, Name, Salary.
- **Expert** (relationship) connecting Technician (1) and Model (M).
- **Bus** (entity) with attribute: Reg_No.
- **Type** (relationship) connecting Bus (M) and Model (1).
- **Model** (entity) with attributes: no. of Bus, Capacity, modelno (key).

Q5) 2) As all the employees belong to union and within ER diagram ISA hierarchies covers overlap constraint and allows to access technician who are experts.

we cannot create a constraint from RTA in ER digiam.
I think it is not possible directly. So expert must ∮ be a relation from technician which come from ISA hierarchy.

Q3 b) We can convert weak entity set into strong entity set by simply adding appropriate attributes as this approch results in the redundant storage of primary key. Primary key of strong entity set can be added. Thus they will be present in both weak& strong entity set.

∴ we lose the concept of dependency and efficiency will be increased.
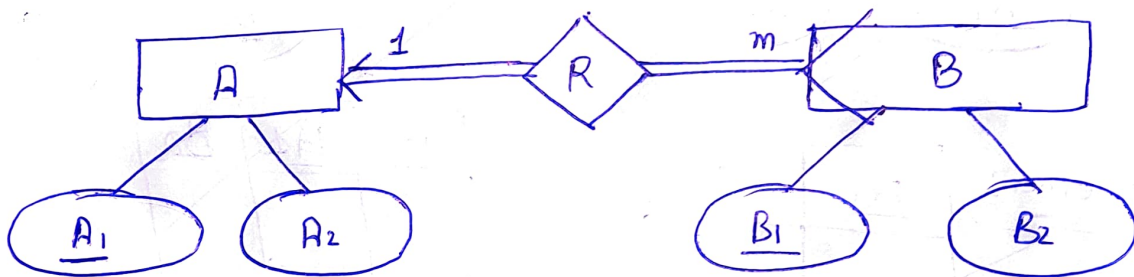
Q5 Case 1:
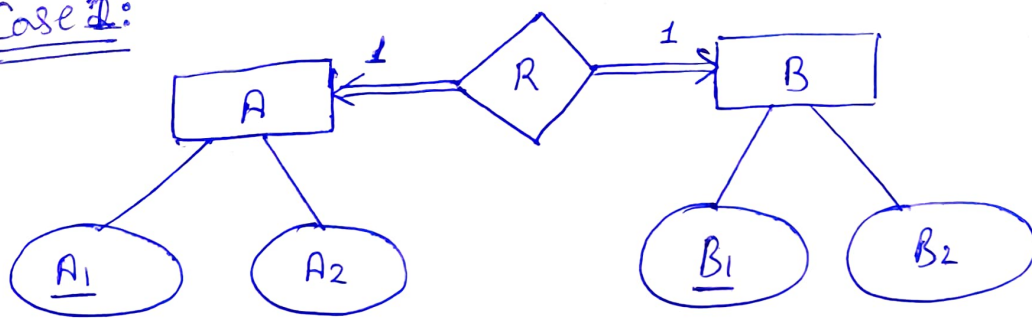
We know when total participation is given for one to one relationship then schema is represented by only single table.

$$ARB \ (\ \underline{A1} \ , \ A2 \ , \ \underline{B1} \ , \ B2 \ )$$

A_1 & B_1 are Primary Keys. So anyone can be chossen as Primary key and other as Foreign key.

Case 2

as we have one to many relationship we will combine the entity set B and relationship set R
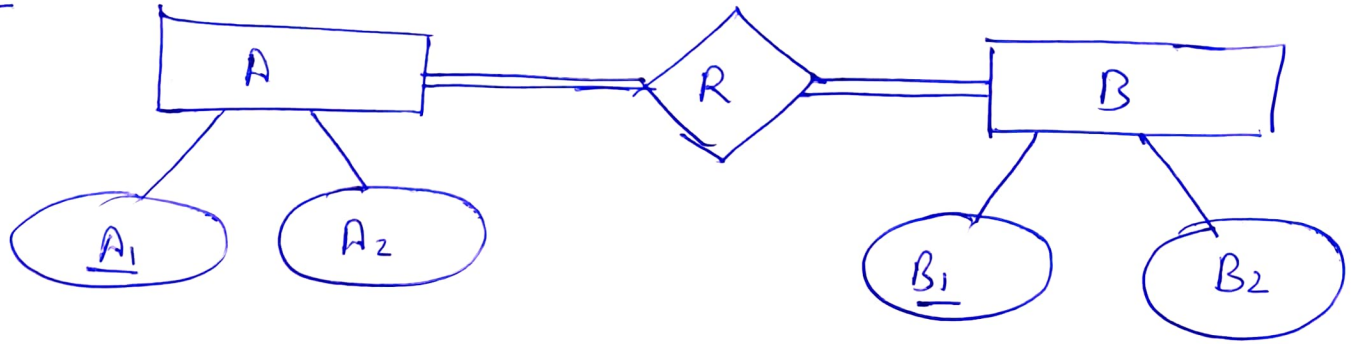
$$A \ (\ \underline{A_1} \ , \ A_2 \ ) \qquad BR \ (\ \underline{B_1} \ , \ B2 \ , \ A_1 \ )$$

F.K.

Because of total participation Primary key & Foreign key acquire NOT NULL Constraint.

Case 3

In many to many Relationship three tables will be created.

P.K

$A(\underline{A_1}, A_2)$

P.K

$R(\underline{A_1}, \underline{B_1})$

P.K

$B(\underline{B_1}, B_2)$

A_1	A_2

A_1	B_1

B_1	B_2

As it is total participation F·K cannot be null.

Q5 b) If there is partial participation from any one of the sides or both side then we can say the foreign key can be Null where as when it is total participation then it can not be Null.