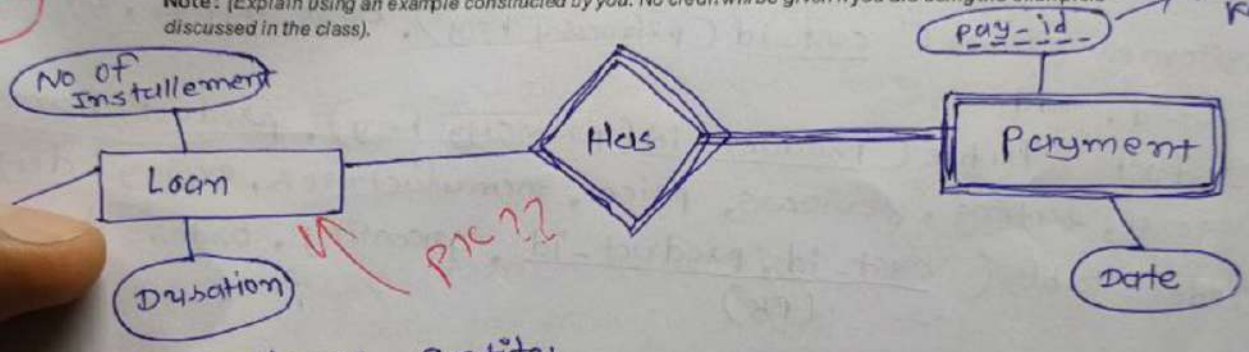
3

1. List and explain the options we have (applicable to the other entity set) when we delete tuples from a strong entity set in a relationship with a weak entity set.
Note: *(Explain using an example constructed by you. No credit will be given if you are using the example/s discussed in the class).*



Loan → strong entity
Payment → Weak entity (depend on Loan, does not exist without loan) primary key (pay_id, loan_id)

(4) options use these when we delete tuples from strong entity Set

1) ON DELETE NO ACTION → If I will try to remove any loan tuple it will not allowed because corresponding payment is there.

2) ON DELETE CASCADE → If I will delete any loan from Loan table all payments related to that loan will be deleted.

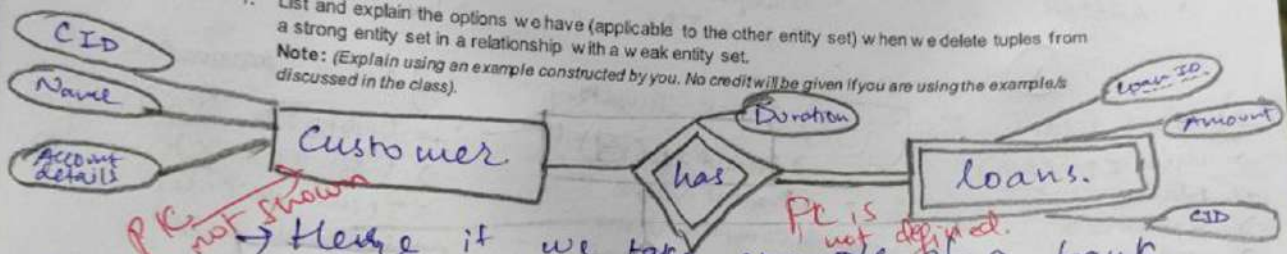
3) ON DELETE SET NULL → Not possible here
After deleting loan tuple corresponding loan_id in payment table becomes NULL

4) ON DELETE SET DEFAULT → If I will delete any loan then in payment table loan_id will be set to default value

1

- ...question paper has four questions. Write your answers strictly in the space provided.
- Each question carries equal marks.

1. List and explain the options we have (applicable to the other entity set) when we delete tuples from a strong entity set in a relationship with a weak entity set.
Note: *(Explain using an example constructed by you. No credit will be given if you are using the example/s discussed in the class).*



PK not shown

PK is not defined.

→ Here if we take example of a bank database then banks have customers. It is not necessary that each customer will have a loan but each loan would be having a customer

1) Delete that related tuple from weak entity set (loans) First and then delete from strong entity set (customer)

OR

2) Delete From strong entity set and make the value of partial key Null.

OR

3) Remove the relation b/w those 2 tables for just that tuple and then delete the tuple from strong entity set

Partially correct Explanation.

2. Identify THREE most important relations/tables (I would expect to find in the following different database systems. List all the attributes and identify a Primary key for each of them relations/tables.

2.5

a. DAICT Employee Database

1) Employee Table (emp_id (primary key), emp_name, joining_ years, salary, work), address, dept_id (FK))
2) Department Table (dept_id (primary key), dept_name)
3) Dependent table (dep_id, emp_id (PK), dep_name, age, relation)

b. Online Shopping Database

1) Customer Table (cust_id (primary key), cust_name, email, password, address
2) Product Table (product_id (primary key), product_name, category, rating, reviews, price, manufacturer, expiry_date)
3) Order_table (cust_id, product_id, quantity, order_date) (PK)

c. Airline Booking Database

Customer table (cust_id (primary key), cust_name, email, name, password, address
Available_Flights table (flight_id, from(source), to(destination) date and time, rate, class (PK)
Flight table (cust_id, flight id (primary key), date, time tickets Booked)

Resource Center of DAICT

(Resource_id, Resource_type), title, price)
(PK)
(id (primary key), name, email, phone, salary
experience)
_issued_table(Resource_id, student_id, date,
date To Return, issued_by) (PK)
t table (student_id (PK), name, email, phone
branch)

4

3. Consider an entity set Supervisor (PID, f_name, dept_name, PhD_students, salary defined for DAICT PhD students). Obviously, it represents the information regarding PhD students supervised by a Professor. In principle, a Professor may guide many PhD students.

Map this Supervisor Entity Set to the corresponding Relational Representation.

Two relations (tables) could be created

1. * Supervisor (I_ID (primary key), f_name, dept_name, salary)
2. * PHD_students (student_id (primary key), st_name, email, phone, address, I_ID (foreign key), since)

→ One supervisor can supervise many phd_ students So it is one to many relationship
could be created in which phd_students table would be having foreign key that maps to assigned Supervisors.
→ Here PHD_students is multivalued attribute different relation could be created for it.

3

2. Identify THREE most important relations/tables u would expect to find in the following well known database systems. List all the attributes and identify a Primary Key for each of these relations/tables.

1/2

a. DAIICT Employee Database

1) Employee Details
- → EID (P.K)
- → Name
- → Email ID
- → Address

2) Course Details
- → CID (PK)
- → EID (F.K)
- → Coure Name
- → Subject Names.
- → class IDs.

3) Salary
- → Salary ID (P.K)
- → CID (FK)
- → EID (FK)
- → Amount
- → Duration.

1

b. Online Shopping Database

1) User details
- → User ID (PK)
- → Name
- → Email ID
- → Address
- → history of orders.
- → Current cart items

2) Stock Inventory
- → Product ID (PK)
- → Product Name
- → Company Name
- → Category Name
- → MRP
- → Offer Price.
- → Stock left of Product.

3) Orders details
- → Order ID (PK)
- → User ID (FK)
- → Items in Order
- → Recieved date
- → Delivered date
- → Shipping details

1

c. Airline Booking Database

1) Passenger details
- → P_ID (PK)
- → Name
- → phone No.
- → Emergency contacts
- → Medical Insurance
- → Medical history

2) Flights details
- → Flight ID (PK)
- → Date & time of Departure
- → Arrival date & time
- → Pilot details
- → Machenary details

3) Tickets Booked
- → Ticket No. (PK)
- → P_ID (FK)
- → Flight ID (FK)
- → Price details
- → Food details.

1/2

d. Resource Center of DAIICT

1) Books Inventory
- → B ID (PK)
- → CID (FK)
- → Name
- → Author
- → Issued to.
- → Price
- → Publisher

2) Category Inventory
- → C_ID (PK)
- → Name
- → Course
- → Subject ID.

3) Availibility.
- → BID (FK) } (P.K)
- → CID (FK)
- → Date of Issue
- → Date of Return
- → Total Books

(4)

3. Consider an entity set **Supervisor** (I-ID, I_name, dept_name, PhD _students, salary) defined for DAIICT PhD students Database. It represents the information regarding PhD students supervised by a Professor. In principle, a Professor may guide many PhD students.

Map this **Supervisor** Entity Set to the corresponding Relational Representation.

Two relations (tables) would be created
1) Supervisor
2) PhD_ students

1. * Supervisor (I-ID (primary key), I_name, dept_name salary)

2. *PHD_ Students (student_id (primary key), st_name, email, phone, address, I-ID (Foreign key), since)

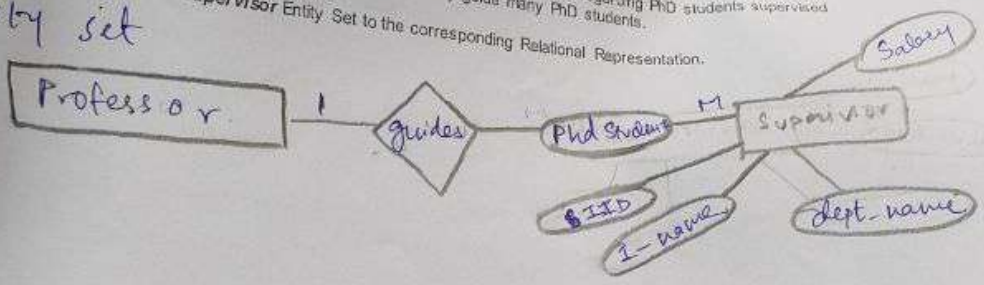
→ One supervisor can supervise many phd_ students So it is one to many relationship two tables would be created in which phd_students table would be having foreign key that maps to assigned Supervisor.

→ Here PHD_ Students is multivalued attribute so different relation would be created for it.

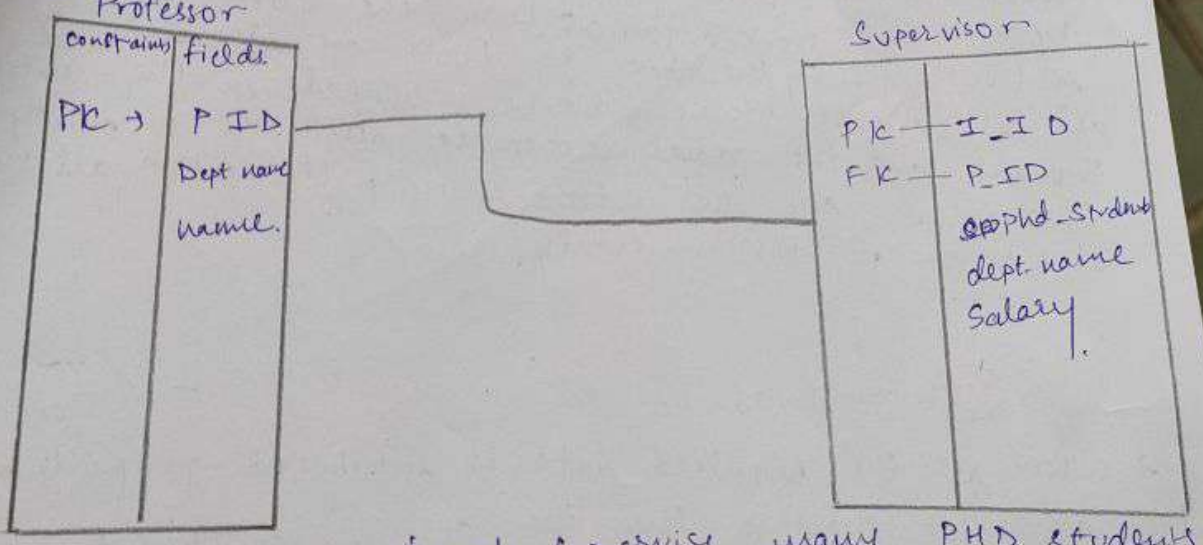
3. Consider an entity set **Supervisor** (I-ID, I_name, dept_name, PhD _students, salary) defined for DAIICT PhD students Database. It represents the information regarding PhD students supervised by a Professor. In principle, a Professor may guide many PhD students. (2)

Map this **Supervisor** Entity Set to the corresponding Relational Representation.

* Entity Set



* Relational Representation



→ I professor can ~~teach~~ supervise many PHD students

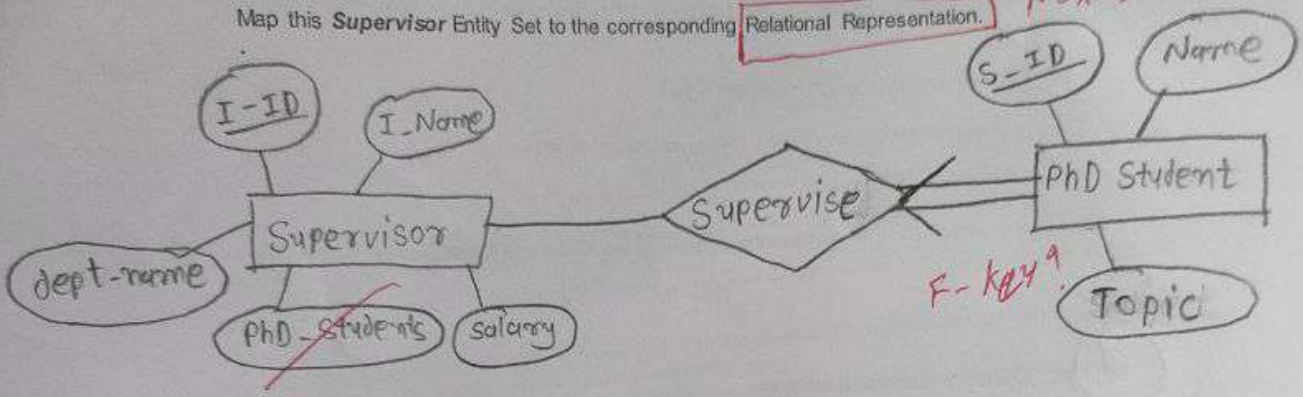
∴ P.K of professor is F.K of Supervisor ?

3

3. Consider an entity set **Supervisor** *(I-ID, I_name, dept_name, PhD _students, salary)* defined for DAIICT PhD students Database. It represents the information regarding PhD students supervised by a Professor. In principle, a Professor may guide many PhD students.

Map this **Supervisor** Entity Set to the corresponding Relational Representation.

Not ERD



→ From above diagram, we can say that : Supervisor - supervise - PhD.Student is an one-to-many relationship.
However it is not necessary that all the supervisor has the students to supervise.

→ From PhD student entity, this relation has total participation. So, above relation can be mapped as :

PhD_Student Supervised (S_ID, I-ID, Name, Topic)

Supervisor (I-ID, I_Name, dept-Name, PhD_students, salary)

4. Answer the following in the context of the Hierarchy in the E-R Model of **Digital Library Database Management System.**

This Hierarchy contains **Resource (resource_ID, title, price)** as a super entity set. It has 3 sub-entity sets :

Books (author, publisher, no of Pages)

Journals (publication year, volume, editor, list of papers)

Videos (format, length)

Write how you map this Hierarchy to the corresponding Relational Model representation when

a. Covering Constraint is **TRUE**

Since covering constraint is true, every resource must be one of the three sub-entity sets.

Mapping can be done in 2 ways :-

1) When converting to relational model every relation representing the sub-entities can also have attributes resource_ID, title and price in them. Also resource_ID will act as primary key.

2) Every sub entities can be assigned as primary key, ~~which~~ ~~can~~ and the relationship b/w Resource and sub-entities can be represented using another relation (table).

b. Covering Constraint is **FALSE**

Since covering constraint is false, ~~every~~ so there may exist resources which are neither of the 3 ~~sub~~ books, journals and videos.

Hence while mapping there will be separate relations for resource, books, journals and videos and ~~relation b/w~~ relationship b/w resources and other 3 can be represented using relations (separate tables).

2. A. Answer the following in the context of the *Hierarchy* in the E-R Model of *Digital Library Database Management System*.

This Hierarchy contains **Resource (resource_ID, title, price)** as a *super entity set*. It has 3 *sub-entity sets* :

Books (author, publisher, no of Pages)

Journals (publication year, volume, editor, list of papers)

Videos (format, length)

Write how you map this Hierarchy to the corresponding *Relational Model* representation when

a. Covering Constraint is **TRUE**

Resource (resourceID, title, price, resourceType)

Books (author, publisher, no of Pages, resourceType)

Journals (publication year, volume, editor, list of papers, resourceType)

Videos (format, length, resourceType)

b. Covering Constraint is **FALSE**

Resource (resourceID, title, price)

Books (resourceID, author, publisher, no of Pages)

Journals (resourceID, publication year, volume, editor, list of papers)

Videos (resourceID, format, length)

(6) 4. Answer the following in the context of the *Hierarchy* in the E-R Model of ***Digital Library Database Management System.***

This Hierarchy contains **Resource** (**resource_ID, title, price**) as a *super entity set.* It has 3 *sub-entity sets :*

Books (*author, publisher, no of Pages*)

Journals (*publication year, volume, editor, list of papers*)

Videos (*format, length*)

Write how you *map this Hierarchy* to the corresponding *Relational Model* representation when

(0) a. Covering Constraint is **TRUE**

→ It means All Resources in our system is either book, Journal or video.

→ Books and Journals and Videos covers Resource.

4 tables would be created ← will be there if constraint is false

(A) Resource (resource_id, title, price)

(B) Books (authos, publishes, no of pages, resource ID (foreign key)

(C) Journals (publicattion yeas, volume, editos, list of papess, resource-id (foreign key)

deos (format, length, resource_id (foreign key)

(6) b. Covering Constraint is **FALSE**

→ False means These are some resources in our system that does not cover books, Journals, or Videos these can be some other type of Resources.

→ Does all the resources are either books, Journals, videos ? (Allowed / Disallowed)

→ Here FALSE means some resources does not belong to any of these three types.

4. Answer the following in the context of the *Hierarchy* in the E-R Model of ***Digital Library Database Management System.***

This Hierarchy contains **Resource (resource_ID, title, price)** as a *super entity set*. It has 3 *sub-entity sets* :

Books (author, publisher, no of Pages)

Journals (publication year, volume, editor, list of papers)

Videos (format, length)

Write how you map *this Hierarchy* to the corresponding *Relational Model* representation when

a. Covering Constraint is **TRUE**

→ when there are more journals than the total ~~nos~~ number books i.e book < journals than the covering constraint is true regarding the books. So. Books are journals so all attributes of Books would be inherited in the entity Journal and the ~~videos are a separate~~ attributes of entity Resource. Also the videos entity will contain all the attributes of Resource entity.

b. Covering Constraint is **FALSE**

→ when all the required data is distributed properly and there ~~are~~ is no shortage then the covering constraint is true.
→ So attributes of Resource & Books would be inherited in journals & attributes of Resource would be inherited in Books & videos.