TOPICS TO BE COVERED

01 Foreign Key Concepts

02 ER to RDBMS Conversions

ER MODEL

Entity & Entity Set

Relationship & Relationship Set

Attribute & Attribute type

Degree of Relationship Set
1. unary
2. Binary
3. Ternary
4. N-ary!

Participation Constraints

Total ($=$)

Partial participation

Cardinality Ratio

1:1

1:M

M:1

M:N

Strong Entity Set
Weak Entity Set
Symbols of ER MODEL

key Attribute

(Roll No.)

Descriptive Attribute

Emp   Work   Compa
[E1]   < R >   [E2]

(Since)
Descriptive
Attribute
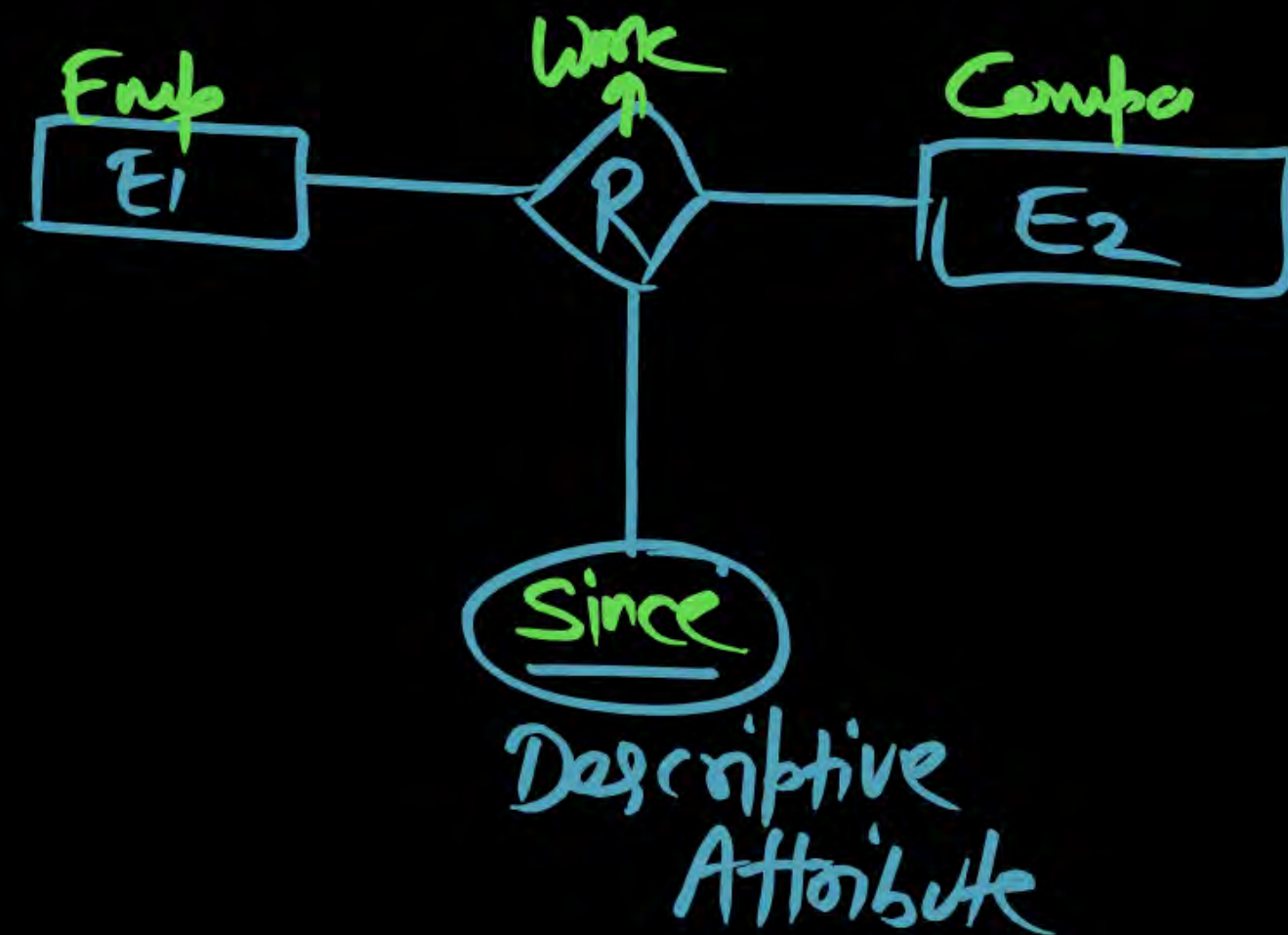
Foreign key : foreign key is a Set of Attribute which Reference to Primary OR Alternative key of the Same Table OR Some other Table.

Referential Integrity Constraints

Foreign key

Foreign key is a set of attributes that references primary key or alternative key of the same relation or other relation.

Reference

same
or
other
Table

Primary key
or
A.K
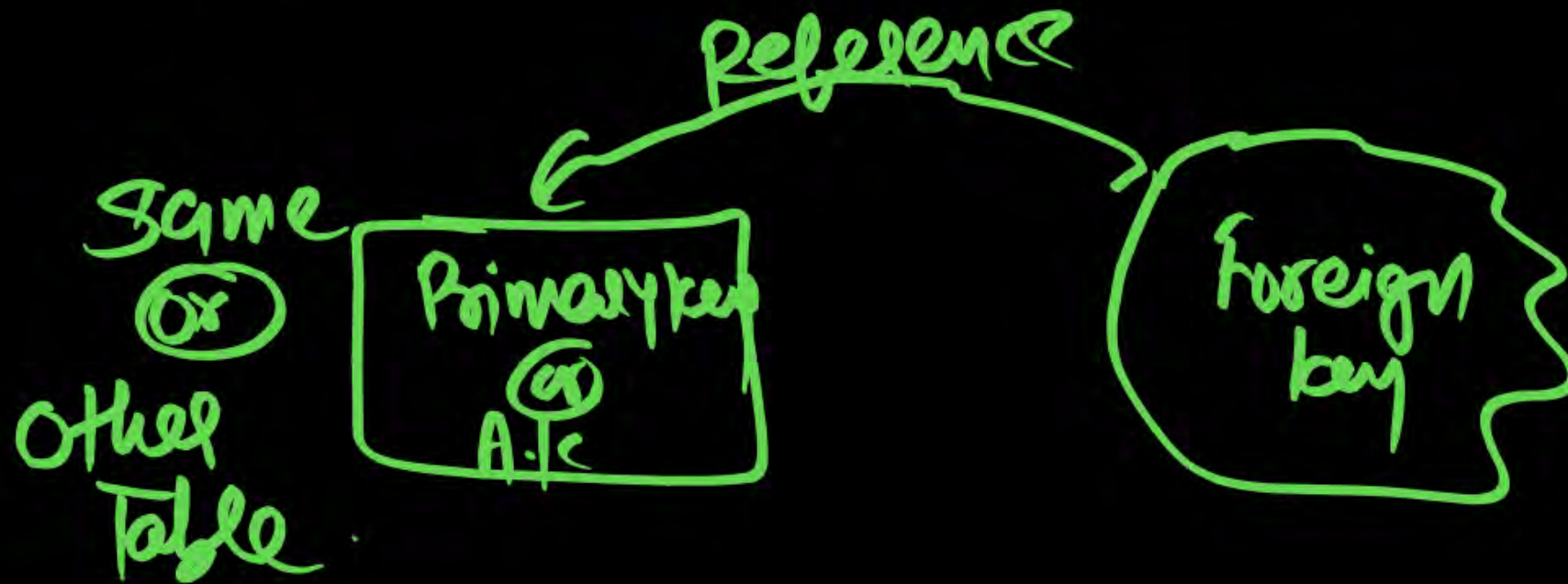
foreign
key

CNC [Cycle Not
Conflict]

Foreign ____ : out of India
↓↓   NRI
Referencing   ↳ go(ing)

(Parent Table)

Referenced Relation: The Table which is Referenced by foreign key is called Referenced Relation (Table)

(CHILD Table)

Referencing Relation: : Table which Contain the foreign key is known as Referencing Relation.

Referential Integrity Constraints

Foreign key

P.K of the Student Table

P.k : Sid

Student	Sid	Sname	Age

Referential Key must be (PK or AK)

Referenced Relation

Sid is foreign Key in Enroll Table

P.K : Sid Cid
Foreign key : Sid

Enroll	Sid	Cid	Fee

Referencing Relation

Foreign Key

Foreign Key: is a set of Attribute reference to the primary key or alterative key of the same table or same other table.

Same or Different table | Primary key or alternative key | ← Reference — | Foreign key

It is used to relate or relation (table) with other or same relation (table)

(i) **Referencing Relation:** Table which contain the foreign key is known as Referencing Relation [CHILD Relation].

(2) **Referenced Relation:** Table which is referenced by foreign key is referenced relation. (Parent Table)

Foreign Key Constraint
[Referential Integrity Constraint]

STUDENT

Sid	Sname	Login
S_1	A	X-@
S_2	A	XY@
S_3	B	XYZ@
S_4	C_1	WXYZ@

Enrolled

Sid	Cid	Fees
S_1	C_1	5K
S_1	C_2	6K
S_2	C_1	7K
S_3	C_2	8K

Sid of Enrolled table is the foreign key referencing to the primary key of student table.

[Sid: Primary Key]

Referenced Relation (Parent)

[Sid, Cid: Primary Key]

Referencing Relation (CHILD)

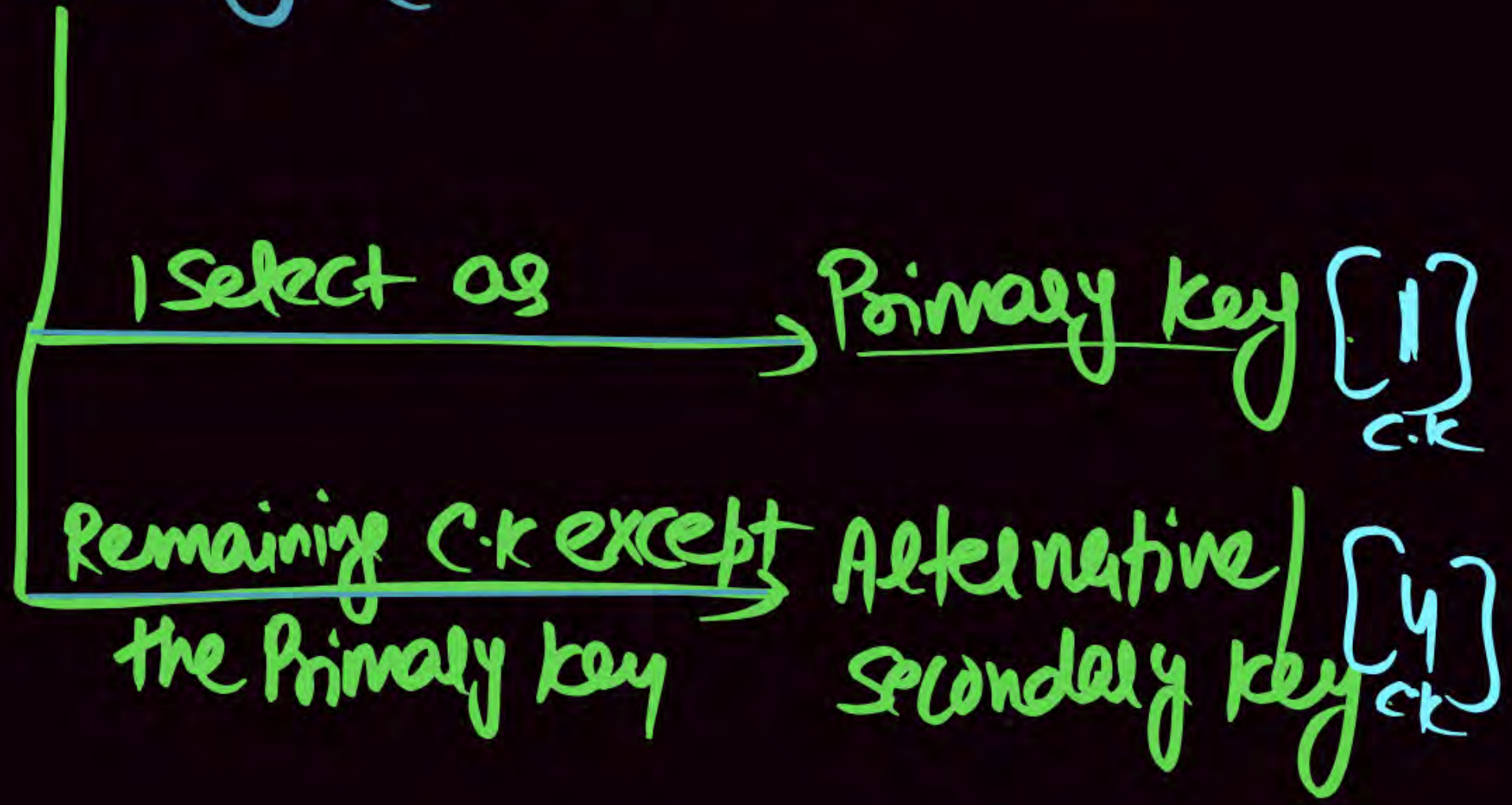**Note**

In a table At Most One Primary key Possible.

Candidate key [Assume 5 C.k]

v.Imp.

Primary key
(Unique + Not Null)

Select as ⟶ Primary key [1] C.k

Remaining C.k except the Primary key ⟶ Alternative/Secondary key [4] C.k

[P.k + A.k] ⇒ C.k

Foreign key (Sid) Reference Student. (At most 1 PK Per Table)

(when Sid is P.K of Student table

Because By default foreign key Reference to Primary key.

Assume Sid is Not Primary key, Sid is Alternative key.

Assume Login id is the Primary key.

Foreign key (Sid) Reference Student (Sid)

When Sid is Not Primary key.
of Student table

CREATE TABLE ENROLLED

Sid Varchar (10)

Cid. Varchar (10)

Fees Integer (11)

Primary key (Sid Cid)

| Foreign Key (Sid) Reference Student | → By Default foreign key
Reference to Primary key.

When Sid is the primary key of Student

Let login is primary key & Sid is alternative key then

| Foreign Key (Sid) Reference Student (Sid) | → When Sid is not primary key.

Note — One Table Can act as Parent & Child ie Some times Same table Contain Primary key & foreign key both in a Single table (with Different Name also)

@ **Different Name**

$$R(A \quad B)$$

(Pk) (Fk)
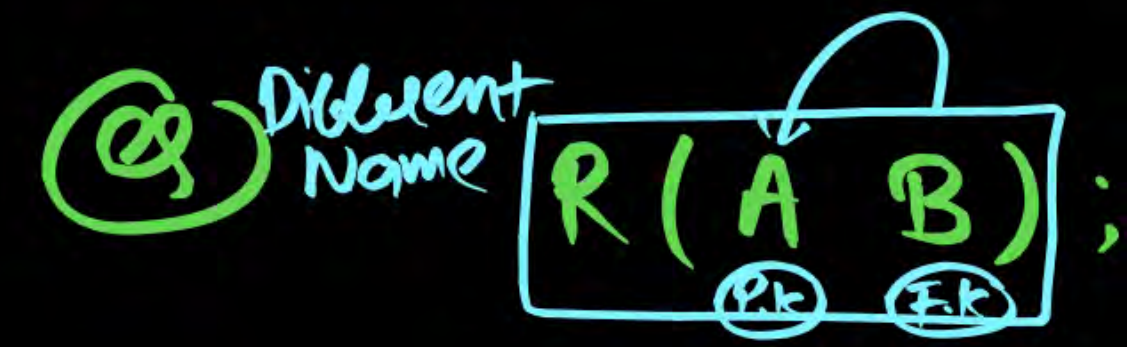
Here A is the Primary key & B is the foreign key Reference to the Primary key A of Relation R.

@ **Emp**

(Eid Ename Deft Salary Supervision id) (Fk)

: Supervision is the F.K Reference to the Primary key (eid) of Emp table.

(Note)

The value Present in Foreign key Must be Present in the Primary key of the Referenced Relation.

(Note)

Foreign key May Contain Duplicates & NULL Values.

Foreign Key Constraint
[Referential Integrity Constraint]

STUDENT

P.K →

Roll No	Name	Branch
1	A	CSE
2	B	IT
3	C	CSE

Registration

CNo	Cname	Roll No	← F.K
101	DBMS	1	
102	OS	1	
103	CD	3	
104	TOC	NULL	

Referenced Relation

(Parent)

Referencing Relation

(CHILD)

Q Consider a Relation R(AB) where A is the Primary key & B is the foreign key Referencing to Primary key A. then which of the following is Correct According to the Constraints?

(i) (1,2) (2,3) (3,4) (4,4) (5,2) (5,3)

P.K Unique

(ii) (1,3) (2,4) (3,4) (4,7) (5,6) (6,1)

F.K must be present in P.K

(iii) (1,2) (2,3) (3,4) (4,5) (5,1) (NULL,2)

P.K Not NULL

(iv) (1,2) (2,3) (3,4) (5,6) (6,3) (7,4)

4 Not present in P.K

(e) None of these

A   B

F.K

Q Consider a Relation R(AB) where A is the Primary key & B is the foreign key Referencing to Primary key A. then which of the following is correct According to the Constraints?

(i) (1,2) (2,3) (3,4) (4,4) (5,2) (5,3)

(ii) (1,3) (2,4) (3,4) (4,7) (5,6) (6,1)

(iii) (1,2) (2,3) (3,4) (4,5) (5,1) (NULL,2)

(iv). (1,2) (2,3) (3,4) (5,6) (6,3) (7,4)

(e) None of these

Constraints

① Domain Constraint (Atomic)

② Key Constraint [uniqueness]

③ Entity Constraint [P.k Not NULL]

④ Referential Integrity Constraints (Foreign key Constraint)

Foreign key Constraints (Referential Integrity Constraints)

(Parent Table)
Referenced Rel^n

(CHILD Table)
Referencing Relation

✓ Insert
✗ Delete

✗ Insert
✓ Delete

(Note) Deletion from the Referenced Relation & Insertion into Referencing Relation May Violate the foreign key Constraints.

Note: The value present in <u>Foreign key must be Present in Primary key</u> <u>of Referenced relation</u>

<u>Foreign key may contain duplicate & NULL values.</u>

<u>Parent table</u>	CHILD table
<u>Referenced table</u>	<u>Referencing Relation</u>
✓ Insert < 4 D ECE>	✗ Insert < 105 DSA 6>
✗ Delete < **1** A CSE>	✓ Delete < 103 CD 3>

G is Not Present in P.K

Note: <u>Deletion from the Referenced Relation and Insertion into</u> <u>Referencing Relation may violate Foreign key constraint.</u>

Note: <u>A Relation can Act as Parent & CHILD i.e. Relation may contain a</u> <u>primary key & a Foreign key that Refer to the same Relation.</u>

Foreign Key Constraint
[Referential Integrity Constraint]

STUDENT

P.K →

Roll No	Name	Branch
1	A	CSE
2	B	IT
3	C	CSE

Referenced Relation

(Parent)

Registration

CNo	Cname	Roll No	← F.K
101	DBMS	1	
102	OS	1	
103	CD	3	
104	TOC	NULL	
105	DSA		

Referencing Relation

(CHILD)

Referential Integrity Constraint

(1) Referenced Relation

(i) Insertion : No Violation ✓

(ii) Deletion : May cause Violation if Primary key is used by referencing relation

I. ON DELETE NO ACTION.

II. ON DELETE CASCADE.

III. ON DELETE SET NULL.

I. Foreign key (Sid) Reference STUDENT(Sid)
ON DELETE NO ACTION. → Deletion Prohibitated (Not allowed)

II. Foreign key (Sid) Reference STUDENT(Sid)
ON DELETE CASCADE.

III. foreign key (Sid) Reference STUDENT (Sid)
ON DELETE SET NULL.

Foreign key

Referenced Relation

1. **Insertion** : No violation

2. **Deletion** : [May cause violation]

(a) **On delete no action** : Means if it cause problem on delete then

violation.

deletion is not allowed on table.

(b) **On delete cascade** : If we want to delete primary key value from referenced table then it will delete that value from referencing table also.

(c) **On delete set null** : If we want to delete primary key value from referenced table then it will try to set the null values in place of that value in referencing table.

<u>ON DELETE CASCADE</u> : Whenever Primary Key Deleted then Corresponding Tuple in Referencing Relation (that P.k used) also Deleted CasCadelelly.

(Note) Not Suggestable when Same table Contain P.k & F.k Both.

(like in Previous eg Due to Deletion of (E2, NULL) Complete Table Deleted.

Foreign Key Constraint
[Referential Integrity Constraint]

ONDELETE CASCADE

STUDENT		
Roll No	**Name**	**Branch**
1	A	CSE
2	B	IT
3	C	CSE

P.K →

Registration		
CNo	**Cname**	**Roll No**
101	DBMS	1
102	OS	1
103	CD	3
104	TOC	-

← F.K

ON DELETE CASCADE

Referenced Relation

(Parent)

Referencing Relation

(CHILD)

eid P.k & Supervisior id F.k Reference to eid.

@ If We Delete $(E_2, NULL)$
with On Delete Cascade

then How Many tuples
additionaly Deleted to Preserve
Referential Integrity ?

foreign key (Supervisiorid) Reference Emp
On DELETE CASCADE

Emp

eid	ename	Sal	Supervisiorid
P.k			F.k On Delete Cascade
E_1			E_2
E_2			NULL
E_3			E_2
E_4			E_3
E_5			E_4
E_6			E_5

Sum ① If Delete (E_2, NULL) then Primary key 'E_2' Deleted

Due to P.k E_2 ⇒ [E_1 E_2] (E_3 E_2)

Now P.k E_1 & E_3 also Deleted

Due to E_3 ⇒ (E_4, E_3) Deleted

Now P.k E_4 also Deleted

Due to E_4 ⇒ (E_5, E_4) Deleted

Now P.k E_5 also Deleted

Due to E_5 ⇒ [E_6, E_5] Deleted

Emp

eid	ename	Sal	Supervisor id
① E_1			E_2
E_2			NULL
② E_3			E_2
E_4			E_3
E_5			E_4
E_6			E_5

P.k

F.k On Delete Cascade.

Complete Table Deleted (in this example))

NOTE:

If foreign key field is not null attribute then "On delete set null" is same as "on delete no action."

Foreign key

3. **Updation** : [May cause violation]

    (a) On update no action

    (b) On update cascade

    (c) On update set null

Referencing Relation

1. **Insertion** : [May cause violation]

2. **Deletion** : No violation

3. **Updation** : [May cause violation]

NOTE:

If integrity violation occurs because of insertion or updation in referencing table then restrict insertion and updation.

P.K   F.K

A	B
2	4
3	4
4	5
5	4
6	2

B is foreign key

Referencing A,

Delete (2, 4) and

on delete cascade

A	B
3	4
4	5
5	4

Result

So, If we delete (2, 4) then PK "2". gets deleted from the table and all the tuples in which B is referencing PK.2" also gets deleted.

Q. The following table has two attributes A and C where A is the primary key and C is the foreign key referencing A with on-delete cascade.

The set of all tuples that must be additionally deleted to preserve referential integrity when the tuple (2, 4) is deleted is:

(A) (,3 4) and (6, 4)

(B) (5, 2) and (7, 2)

(C) (5, 2), (7, 2) and (9, 5)

(D) 1

A	C
2	4
3	4
4	3
5	2
7	2
9	5
6	4

(2.4) Deleted

P.k : 2 Deleted

(5,2) (7,2)

P.k 5 =) (9,5)

Ans (C).

Q. Let R (a, b, c) and s(d, e, f) be two relation in which d is the foreign key of S that refers to the primary key of R. Consider the following four operations on R and S.

(i) Insert into R (ii) Insert into S

(iii) Delete from R (iv) Delete from S

Which of the following is true about the referential integrity constraint above?

A) None of (i), (ii), (iii), or (iv) can cause its violation

B) All of (i), (ii), (iii), and (iv) can cause its violation

C) Both (i) and (iv) can cause its violation

D) Both (ii) and (iii) can cause its violation