COMPUTER SCIENCE

Database Management System

ER Model

Lecture_4

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TOPICS TO BE COVERED
01
Foreign Key Concepts
02
ER to RDBMS Conversions

ER to RDBMS Conversion.

Entity Set → Relation

Composite Attribute → Set of Simple Component

Multivalued Attribute → 2 Tables.
- key + other Attribute.
- key + multivalued Attribute

Q.

The term in list A have been mapped to list B so that is corresponds to the mapping process of ER MODEL into relational. Which of the following represent the mapping process? [MCQ]

List-A	List-B
A. Entity type — 4	1. Primary key (or alternate key)
B. Key attributes — 1	2. Child table
C. Composite attribute — 3	3. Set of simple component attributes
D. Multivalued attribute — 2	4. Relation

A. A-3, B-1, C-4, D-2

B. A-4, B-1, C-3, D-2

C. A-3, B-2, C-2, D-4

D. A-4, B-1, C-2, D-3

Partial Participation

Total (Full) Participation (=)

1 to Many : 2 Table

Many to 1 : 2 Table

1 to 1 : 2 Table

Many to Many : 3 Table.

① If T.P at both Side (in 1:1, 1:m, m:1, m:N) then 1 Table Required.

② If T.P at One Side (in 1:m, m:1, 1:1) then 1 Table Required.

③ If T.P at any Side in m:N (m:m) then 2 Table Required

④ As usual.

Mapping [Cardinality constraints of relationship set]

(For binary relationship)

Partial participation on both side of binary relationship

- One to Many : Merge relationship set towards many side. So, 2 relational tables.
- Many to one : Merge relationship set towards many side. So, 2 relational tables.
- One to one : Merge relationship set any one side. So, 2 relational tables.
- Many to Many : Separate table for each entity set and relationship set. so, 3 relational tables.

Mapping [Cardinality constraints of relationship set]

(For binary relationship)

Full participation on "one" side of many to one relationship

Merge the entities and relationship set into single relational table. So, 1 table.

Mapping [Cardinality constraints of relationship set]

(For binary relationship)

Full participation on "Many" side of Many-to-one relationship

Merge relationship set towards many side. So, 2 relational tables.

Mapping [Cardinality constraints of relationship set]

(For binary relationship)

Full participation on any "one" side in one-to-one relationship

Merge the entity sets and relationship set into single table. So, 1 table.

Mapping [Cardinality constraints of relationship set]

(For binary relationship)

Full participation on any "Many" side of Many-to-Many relationship

Merge relationship set towards any "Many" side of relationship. So, 2 table.

Mapping [Cardinality constraints of relationship set]

(For binary relationship)

Full participation on both side of relationship

1 : 1
1 : M
M : 1
M : N

Merge the entity sets and Relationship into single Relational table so, 1 relational table.

Self-Referential Relationship Set

(Recursive entity set)

Entities of entity set (E) related to some other entity of same entity set (E).

Recursive
Entity set

Self-referential relationship set

- Binary relationship set
- 1: M, M:1, 1:1, M:N can be any of the relationship

Q.

Consider the following entity relationship diagram(ERD), where two entities E1 and E2 have a relation R of cardinality 1:m

The attributes of E1 are A11, A12 and A13 where A11 is the key attribute. The attributes of E2 are A21, A22, A23 where A21 is the key attribute and A23 is a multi-valued attribute. Relation R does not have any attribute. A relational database containing minimum number of tables with each tables satisfying the requirements of the third normal from (3NF) is designed form the above ERD. The number of tables in the database is

[GATE-2004 : 2 Marks]

A 2

B 3

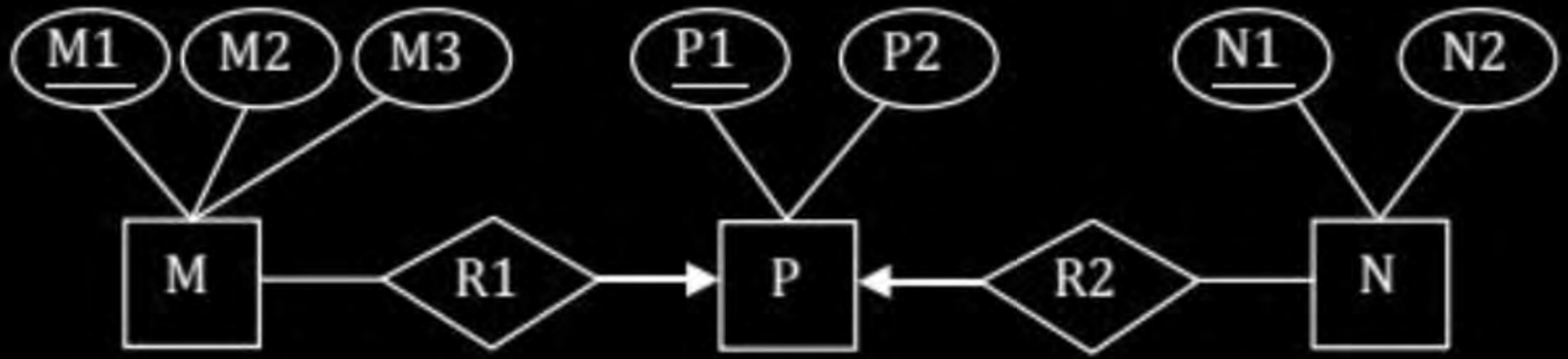
C 5

D 4

Q.

Common Data for Question

Consider the following ER Diagram



(i) The minimum number of tables needed to represent M, N P, R1, R2 is [GATE-2008 : 2 Marks]

A 2

B 3

C 4

D 5

(ii) Which of the following is a correct attribute set for one of the table for the correct answer to the above question?

GATE-2008 : 2 Marks]

A {M1, M2, M3, P1}

B {M1, P1, N1, N2}

C {M1, P1, N1}

D {M1, P1}

Q.1 WHY Merge at Many Side ? (in 1:M)

Q.2 How to Find key of Relationship set ?

Q.3 WHY Not merge at One Side in 1 to many ?

Q.4 ER to RDBMS During Conversion How to Check NF ?

Q.5 WHAT about Complex Attribute During ER to RDBMS ?

Q.6 WHAT about Derived Attribute During ER to RDBMS ?

Q.7 Significance of Total Participation in ER to RDBMS ?

Q.8 Recursive Entity set ?

E-R Model:

Entity Relationship Diagrams used to represent Diagrammatic design [High Level Design] of Databases.

DB Design Steps:

1. Requirement: What type of data stored and what operation required etc.
2. Conceptual and Logical: [ER Diagram]
3. ER Diagram to RDBMS table design and apply normalization.
4. Physical DB Design (Indexing Design)
5. User interface Design && Security Design

High Level Design

Low Level Design

Main Components in ERD:

1. Attributes
2. Entity Sets
3. Relationship Sets

Attribute

Attributes:

Key Attributes:

Multi valued Attribute:

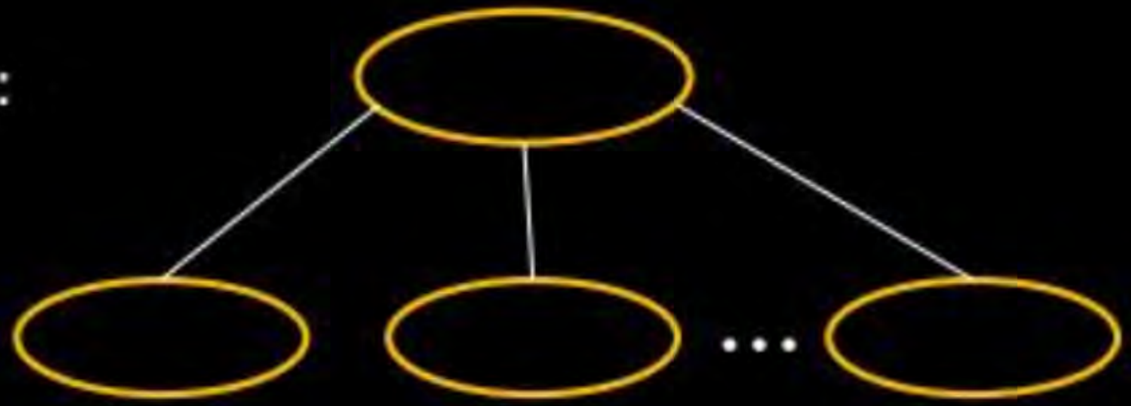
Derived Attribute:

Value derived from
Other stored value

Example:

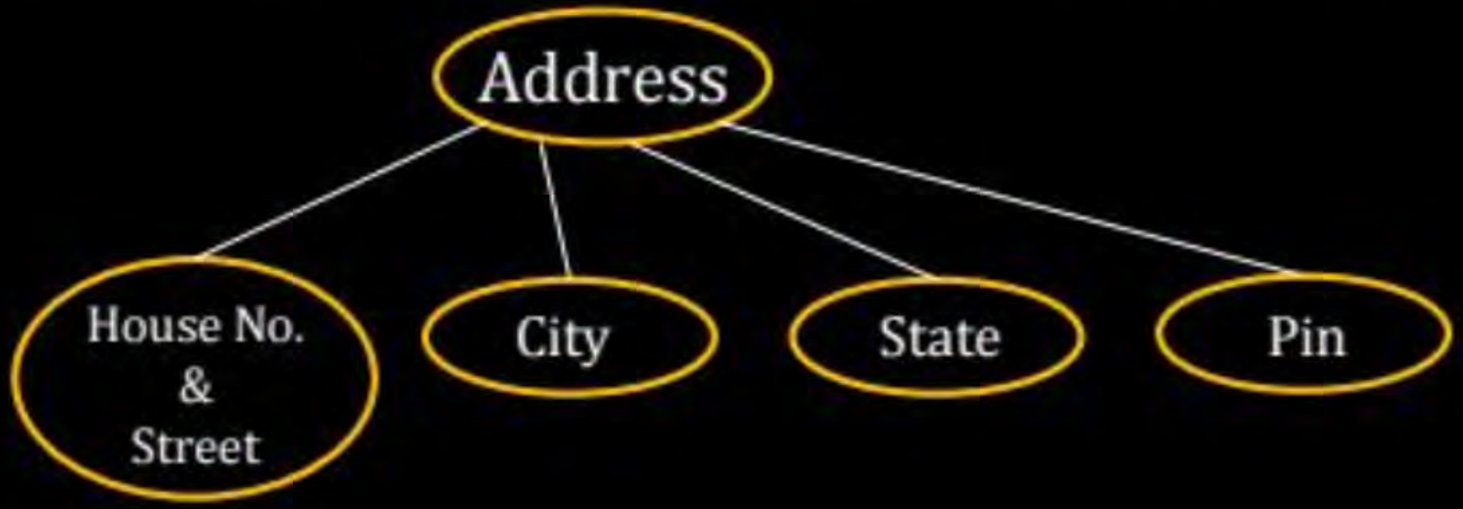
Attribute

Composite Attribute:



Attribute Which can represent as two or more attributes

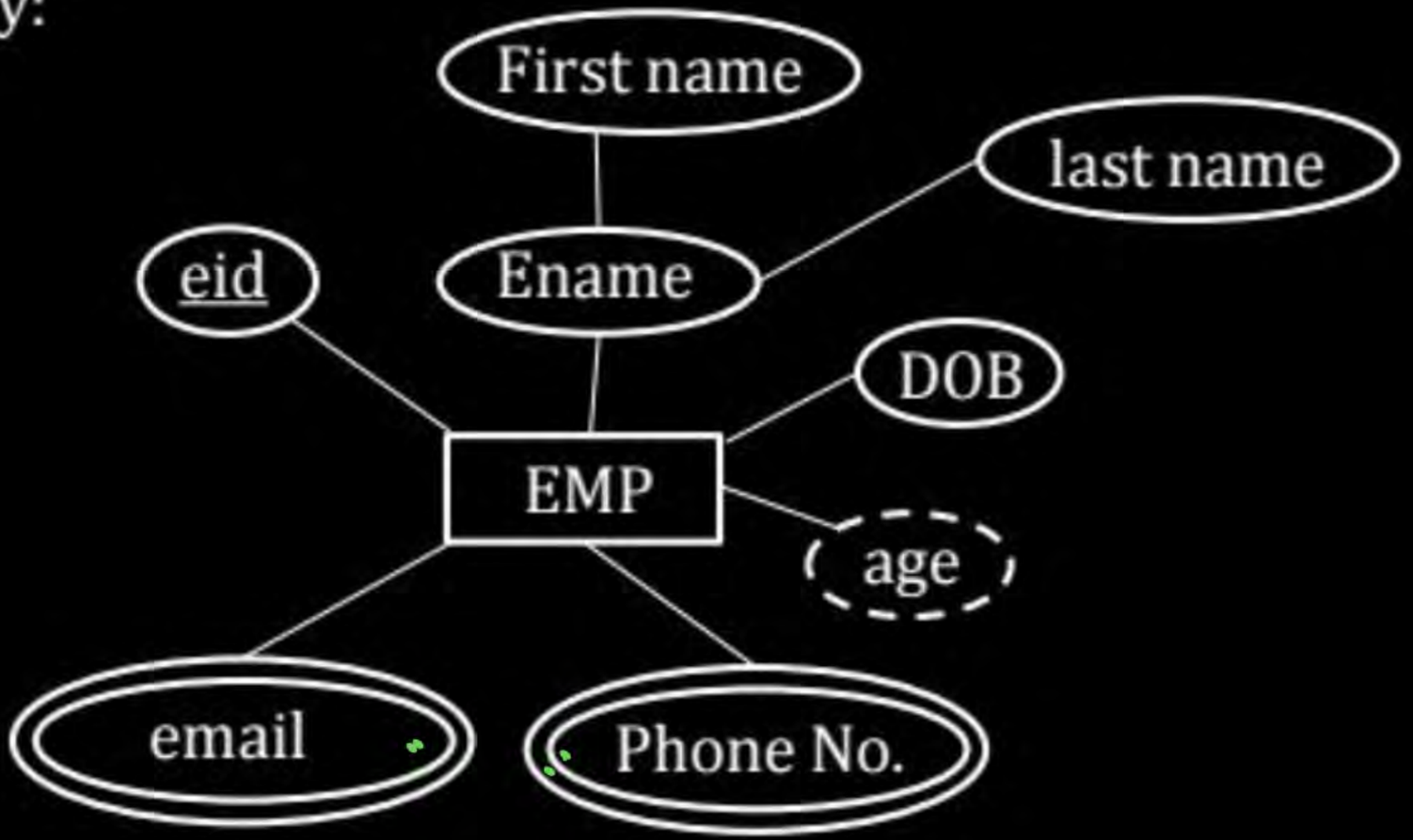
Example:



Entity Set:

Set of similar entities (recorded/objects).

Represented by:



Relationship Set:

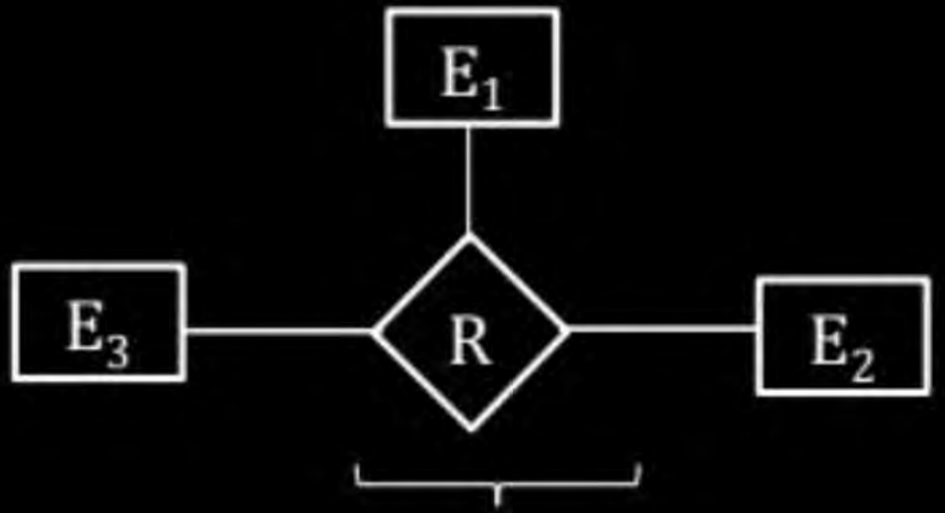
Used to relate two or more entity set.

Represented by:

1.

Binary Relationship

2.



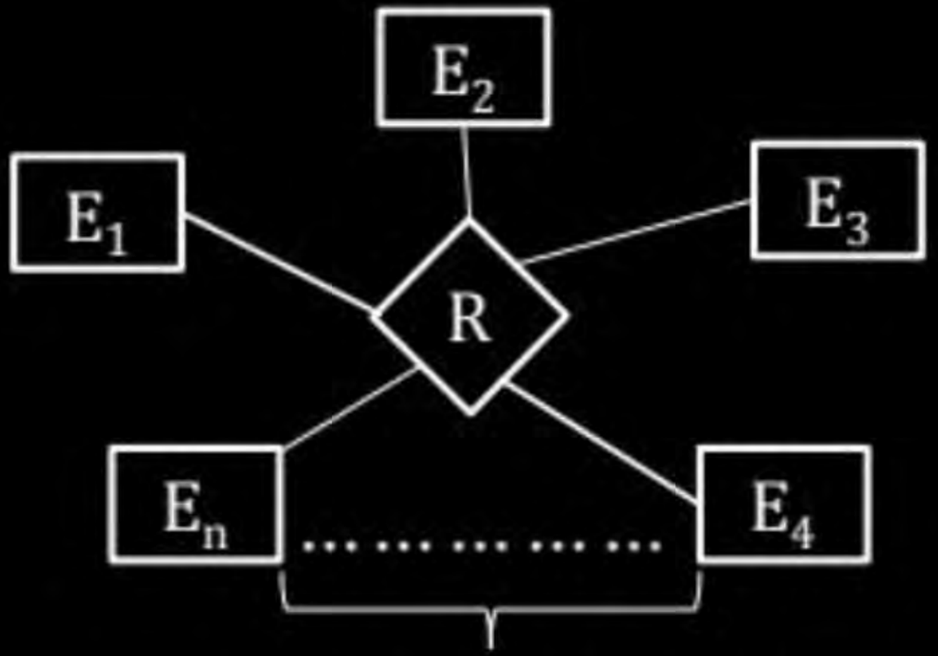
Ternary Relationship

Relationship Set:

Used to relate two or more entity set.

Represented by:

3.



N-ary Relationship

Participation:

If every entity of entity set (E1) must participate with relationship set than Total Participation.

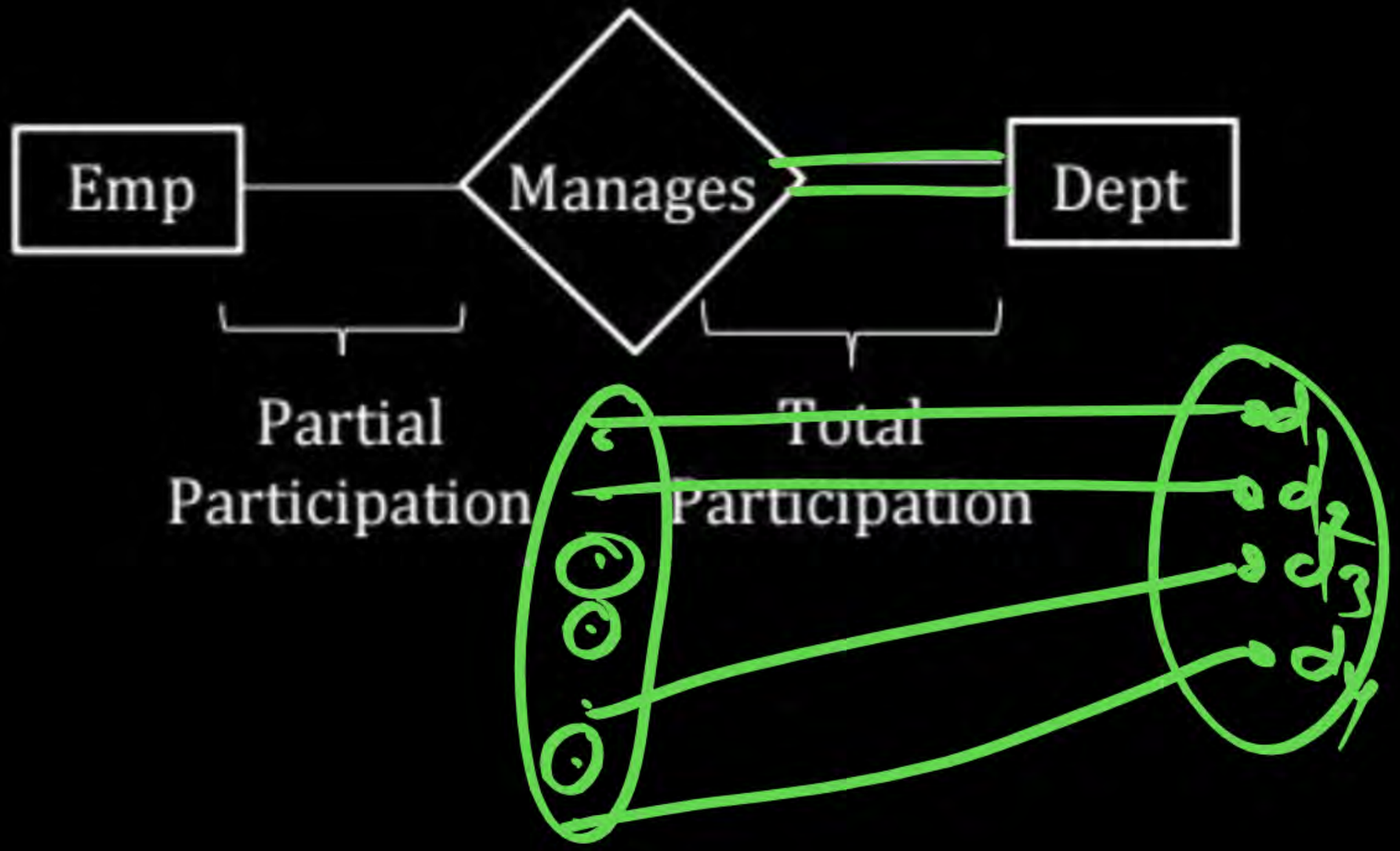
[must be 100% participation]

Otherwise:

Partial Participation:

May or may not 100% participation

Example: "Emp" & "Dept" Entity Set.
"Manages" Relationship Set such that each dept there must be a manager.



Mapping:

Mapping [cardinality of Relationship set]:

One: [At most one] [0.....1]

Many: [0 or more] [0.....M]

Q.1 How to find Ck of Relationship set ?

Q.2 Merge Concept Feeling ?

Possible Mapping of binary relationship sets are:

1) One : One
2) One : Many
3) Many : One
4) Many : Many

Candidate key's of Relationship set is Based on mapping

Q.1 WHY merge at Many Side ? (in 1:M)

Q.2 How to Find key of Relationship set ?

Q.3 WHY Not merge at One Side in 1 to many ?

Q.4 ER to RDBMS During Conversion How to Check NF ?

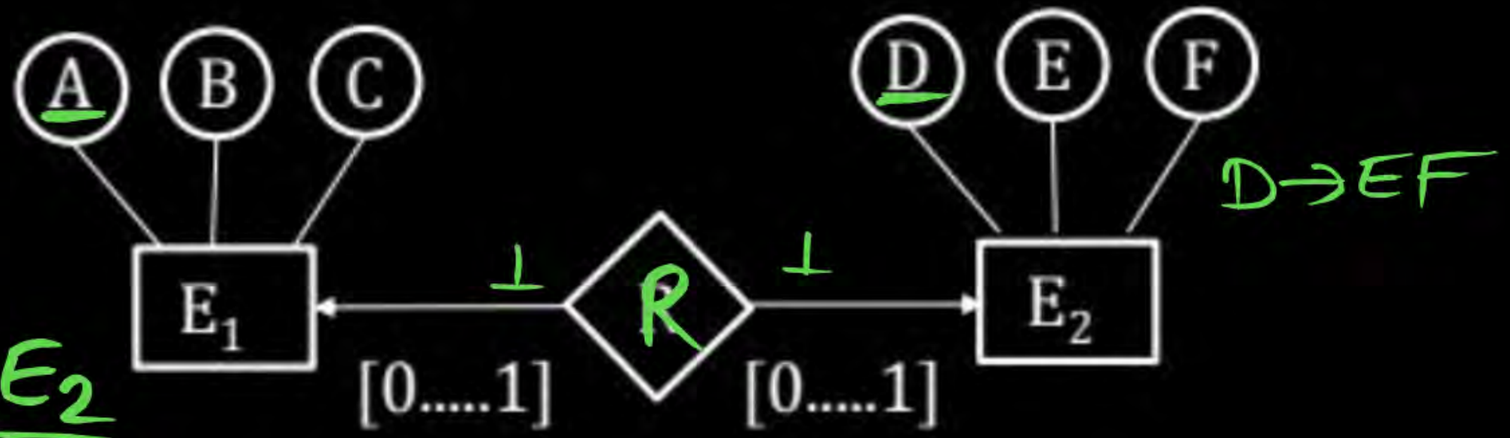
Q.5 WHAT about Complex Attribute During ER to RDBMS ?

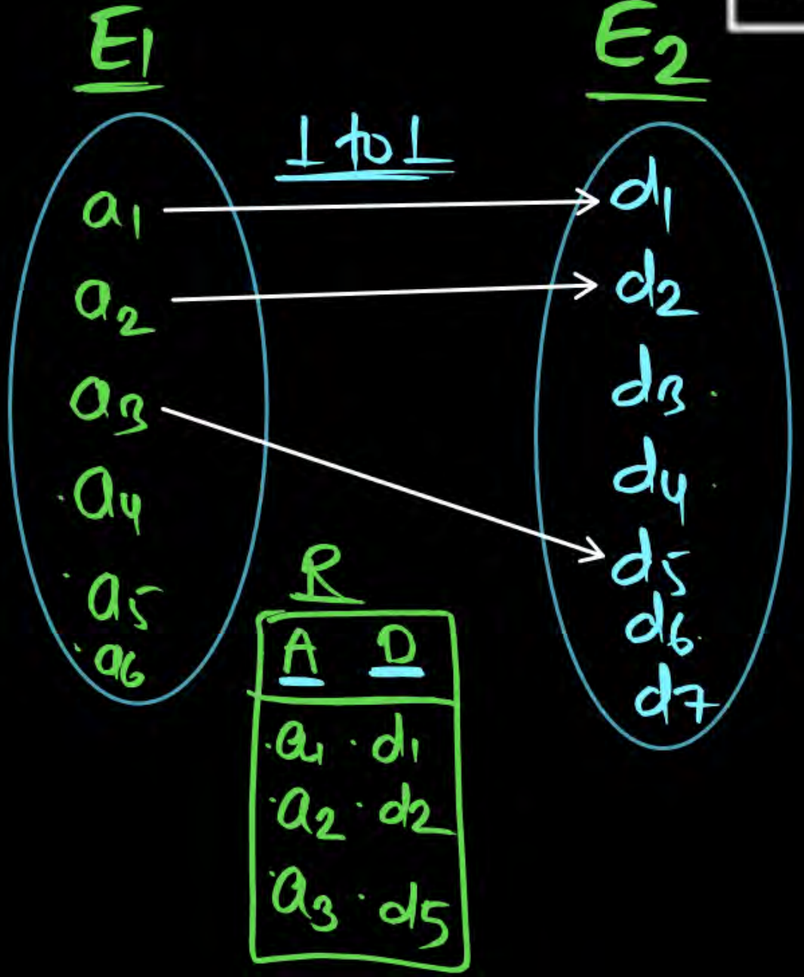
Q.6 WHAT about Derived Attribute During ER to RDBMS ?

Q.7 Significance of Total Participation in ER to RDBMS ?

Q.8 Recursive Entity set ?

One to One:





R (A D) ≡ {A, D}

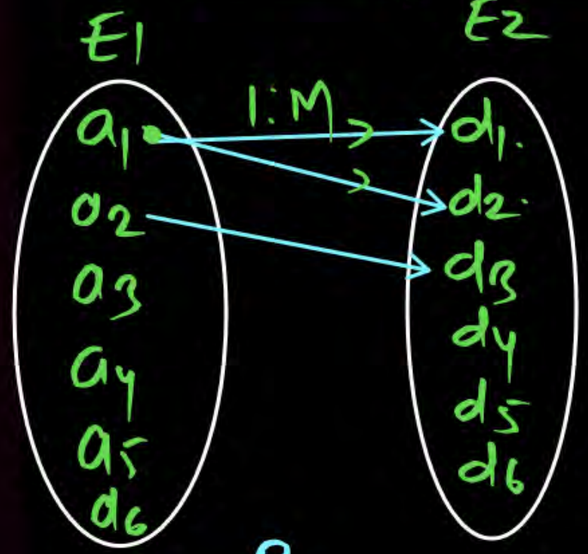
a_1	d_1	1 : 1 mapping
a_2	d_2	candidate key of
a_3	d_5	Relationship set

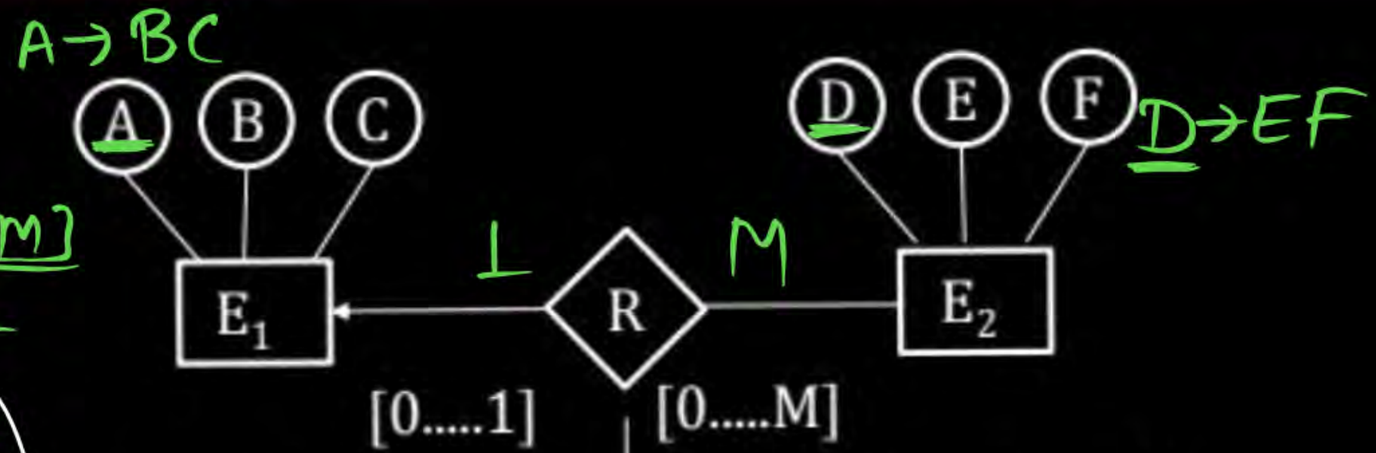
Candidate key = A & D

[2CK] → [A or D]

One: Many:

One : many [1 : M]





Each object of E_2 allowed to pair by at most one entity of E_1

Each entity of E_1 can pair with many E_2 entity.

R

A	D
a_1	d_1
a_1	d_2
a_2	d_3

AX
D ✓

Candidate key of R (A D) ≡ {D}

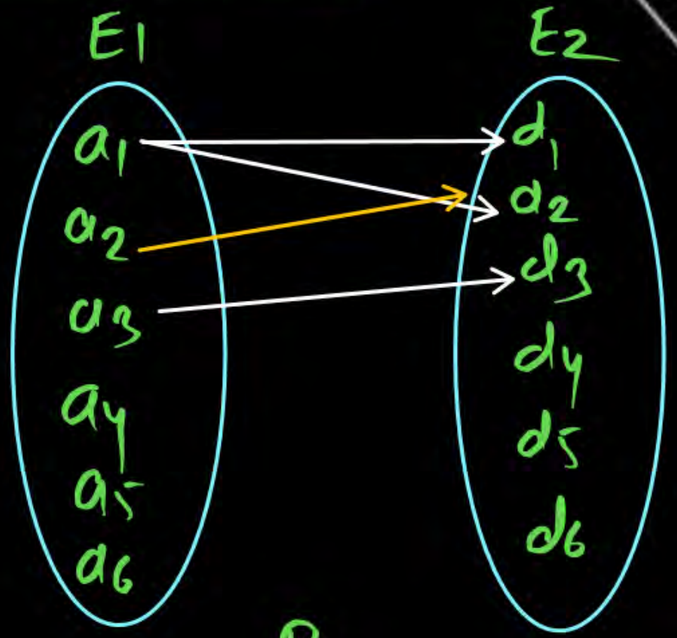
a_1 d_1 : for 1: M

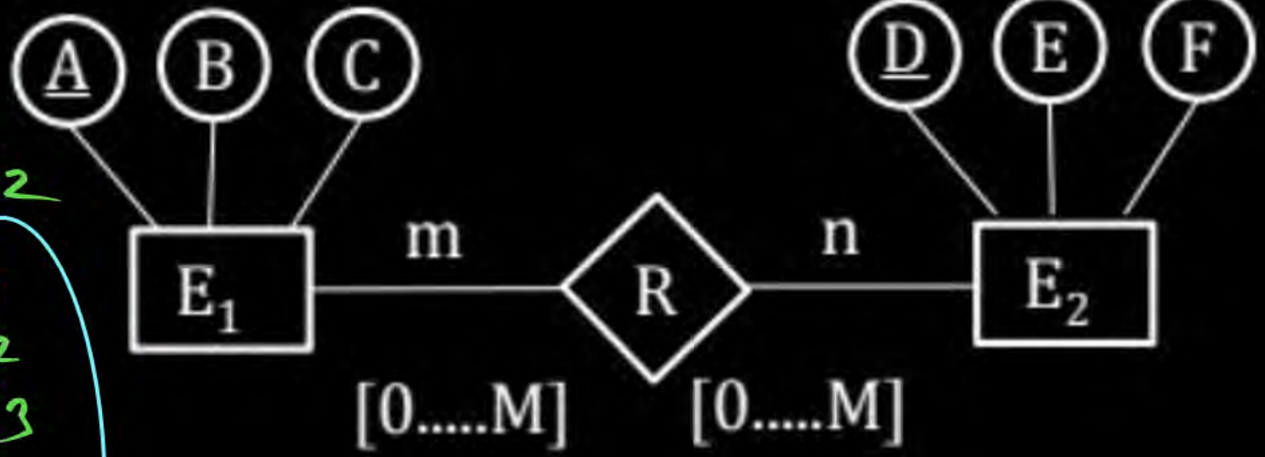
a_1 d_2 Relationship

a_2 d_3

Candidate key : [D]

Many to Many:





R (A D) ≡ {AD}

a_1	d_1
a_1	d_2
a_2	d_2
a_3	d_3

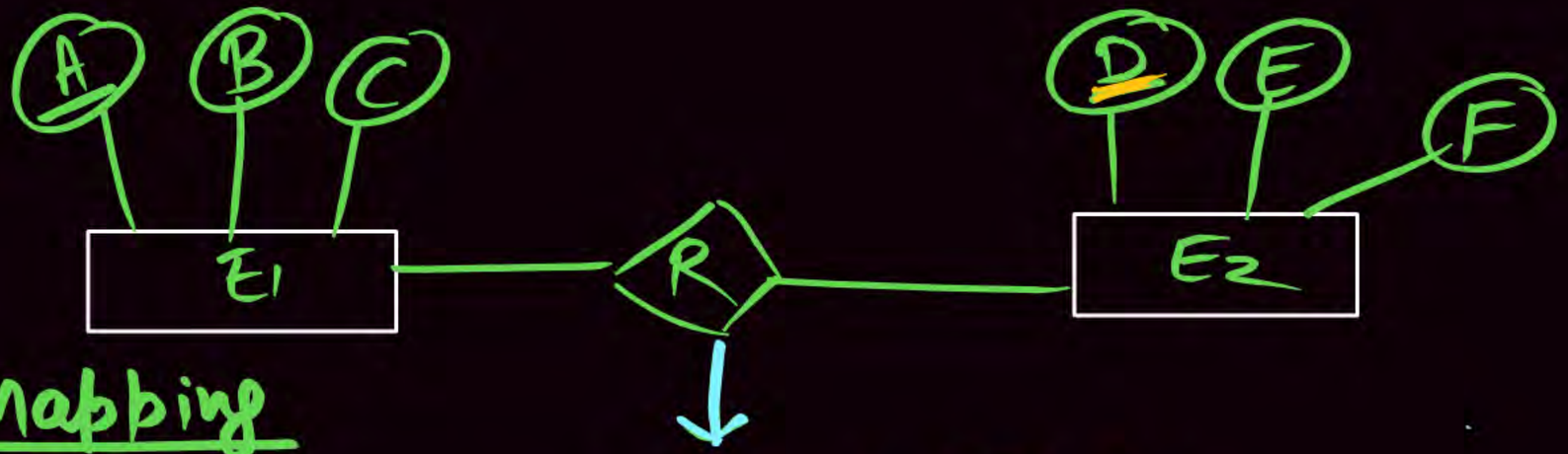
M:N ⇒ for many to many mapping Candidate Key for Relationship Set is {AD}

R

A	D
a_1	d_1
a_1	d_2
a_2	d_2
a_3	d_3

Candidate key = AD

A → BC



D → EF.

Mapping

1 : 1 ⟶ Ck : A or D

1 : M ⟶ Ck : D

M : 1 ⟶ Ck : A

M : N ⟶ Ck : AD

① WHY Merge at Many Side in 1:M & M:1 ?

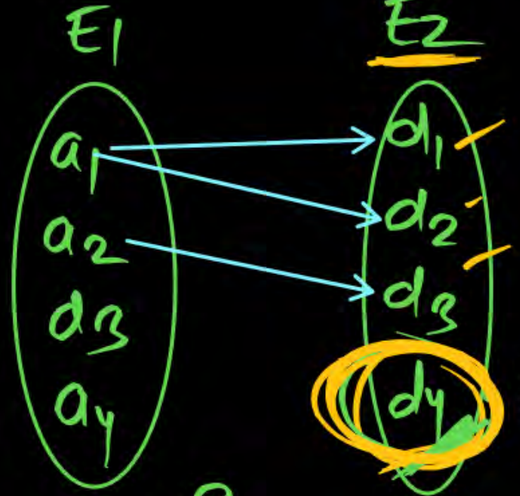
② WHY Not Merge at One Side in 1:M & M:1?

③ How Table Reduced in Full (Total) Participation

④ How to CHECK NF ?

RDBMS Design of Given ERD:

1 : M Relationship:



$E_1(\underline{A}\ B\ C)$

A	B	C
a_1	—	—
a_2	—	—
a_3	—	—
a_4	—	—

$A \rightarrow BC$

{A}

$R(A\ \underline{D})$

A	D
a_1	d_1
a_1	d_2
a_2	d_3

$D \rightarrow A$

{D}

$E_2(\underline{D}\ E\ F)$

D	E	F
d_1	—	—
d_2	—	—
d_3	—	—
d_4	—	—

$D \rightarrow EF$

{D}

R

A	D
a_1	d_1
a_1	d_2
a_2	d_3

CK : D

$D \rightarrow EF$

2 Tables

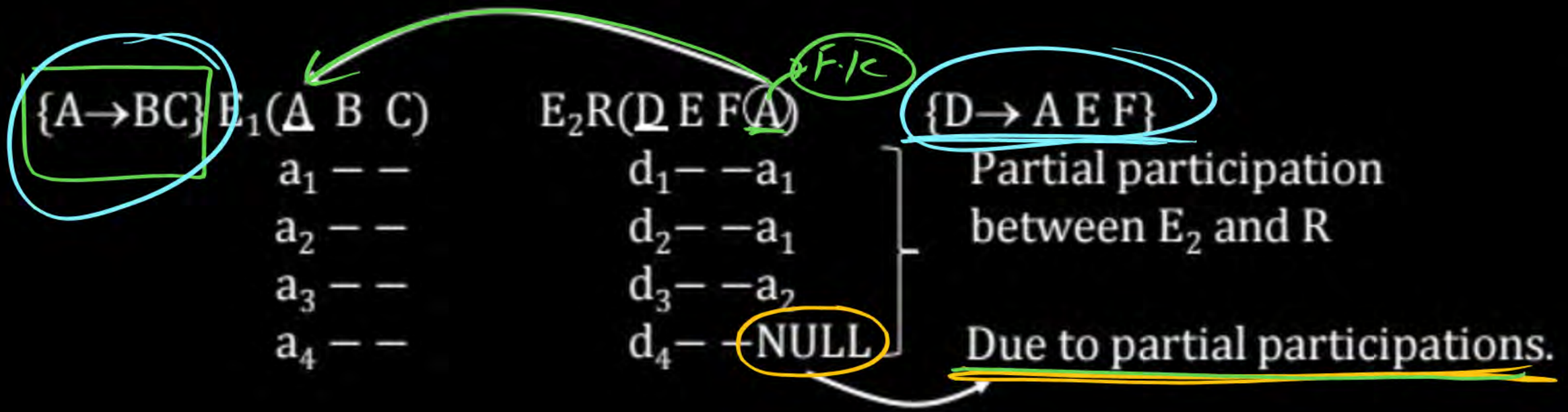
$E_1(\underline{A}\ B\ C)$

$RE_2(\underline{D}\ E\ F\ A)$ — F.K

RE_2

D	E	F	A
d_1	-	-	a_1
d_2	-	-	a_1
d_3	-	-	a_2
d_4	-	-	NULL

F.K contains Null



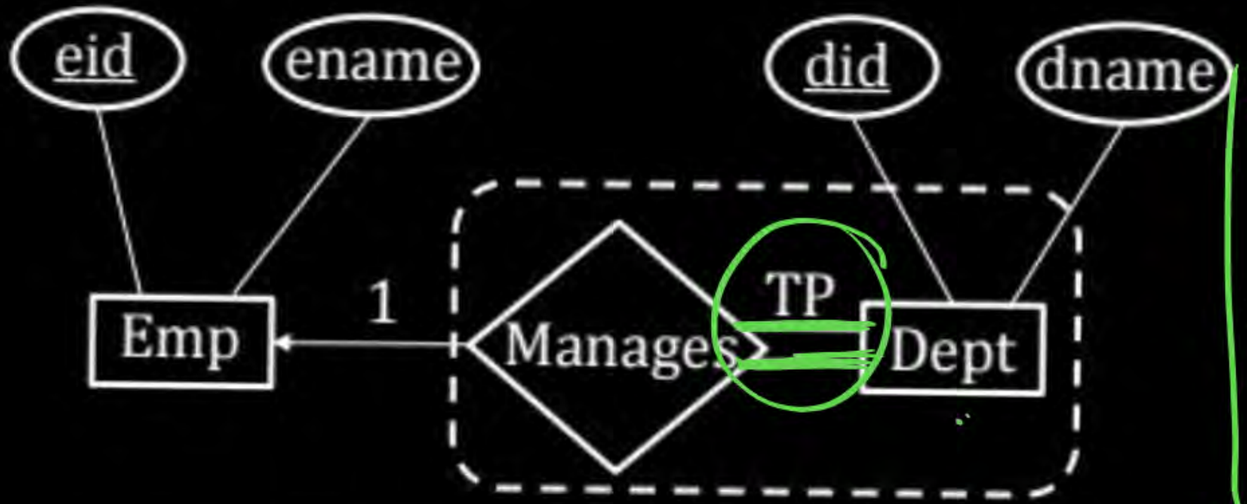
∴ minimum 2 relational Table Required and 1 Foreign Key required for given ERD

$E_1(\underline{A}BC)$ $A \rightarrow BC$

$E_2(\underline{D}EFA)$; $D \rightarrow EFA$

F.K

Given ERD
Example:

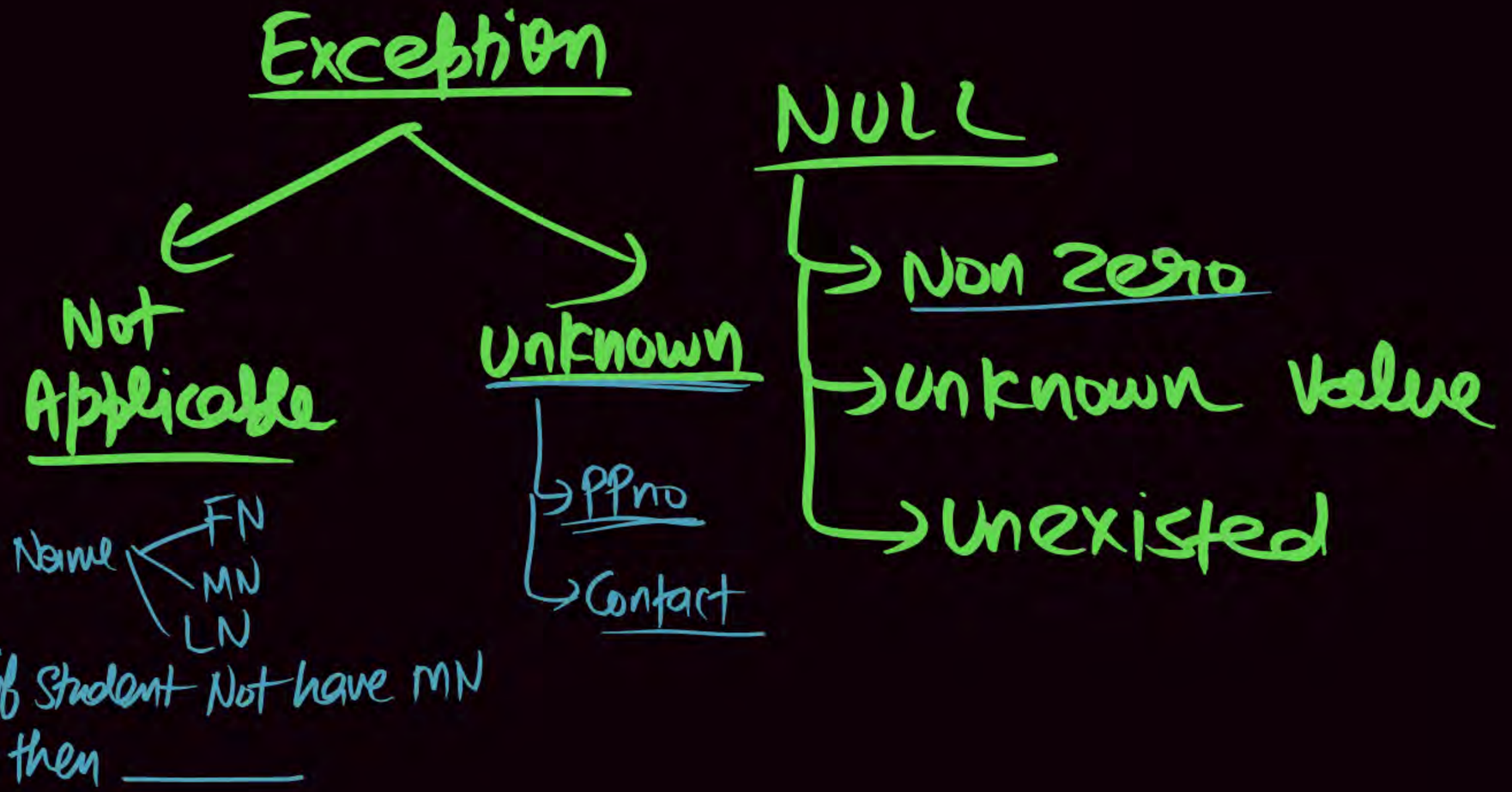


2 Table
Emp(eid ename)
TP: Total Participation
Dept (did dname eid)
F.K

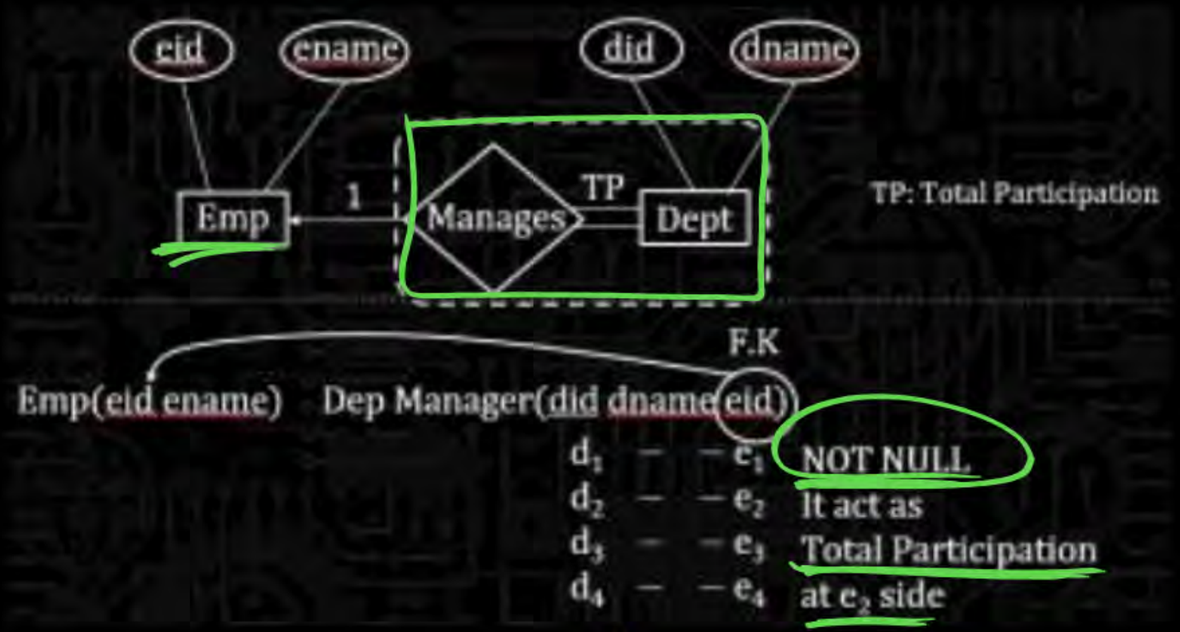
F.K

Emp(eid ename) Dep Manager(did dname eid)

d_1 — — e_1 NOT NULL
d_2 — — e_2 It act as
d_3 — — e_3 Total Participation
d_4 — — e_4 at e_2 side


Exception
Not Applicable
Name
FN
MN
LN
if Student Not have MN then ____
unknown
PPno
Contact
NULL
Non zero
unknown Value
Unexisted

Given ERD



Emp_Dept_Manages
(did dname eid ename)
did → dname
did → eid
(_____ e_5 A)
Not allowed because e_5 not in relationship

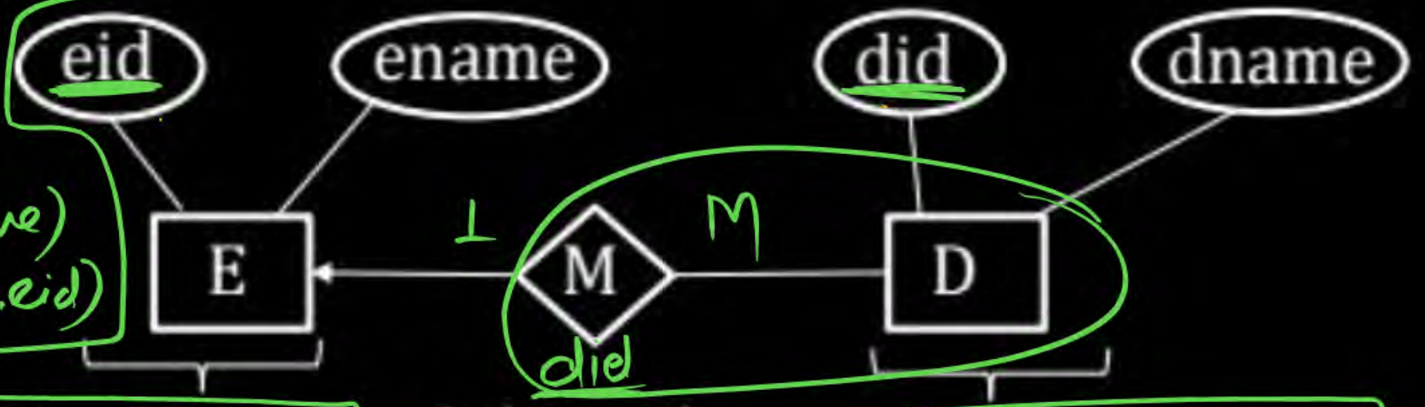
```
CREATE TABLE Dept_manages
(did varchar(10) primary key,
dname varchar(30),
eid varchar(10) NOT NULL,
FOREIGN KEY(eid)
REFERENCES Emp);
```

Q In 1:m Why Not Merge at One Side?

If 1 : M relationship set merges into left side Entity set:

Ans
Actually 2 Table

E(eid, ename)
D(did, dname, eid)



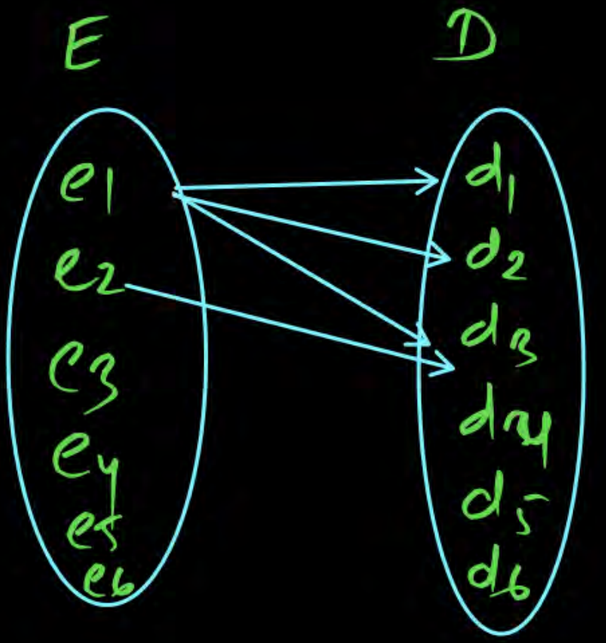
eid → ename did → eid did → dname

E_M(eid ename did) F.k D(did dname)

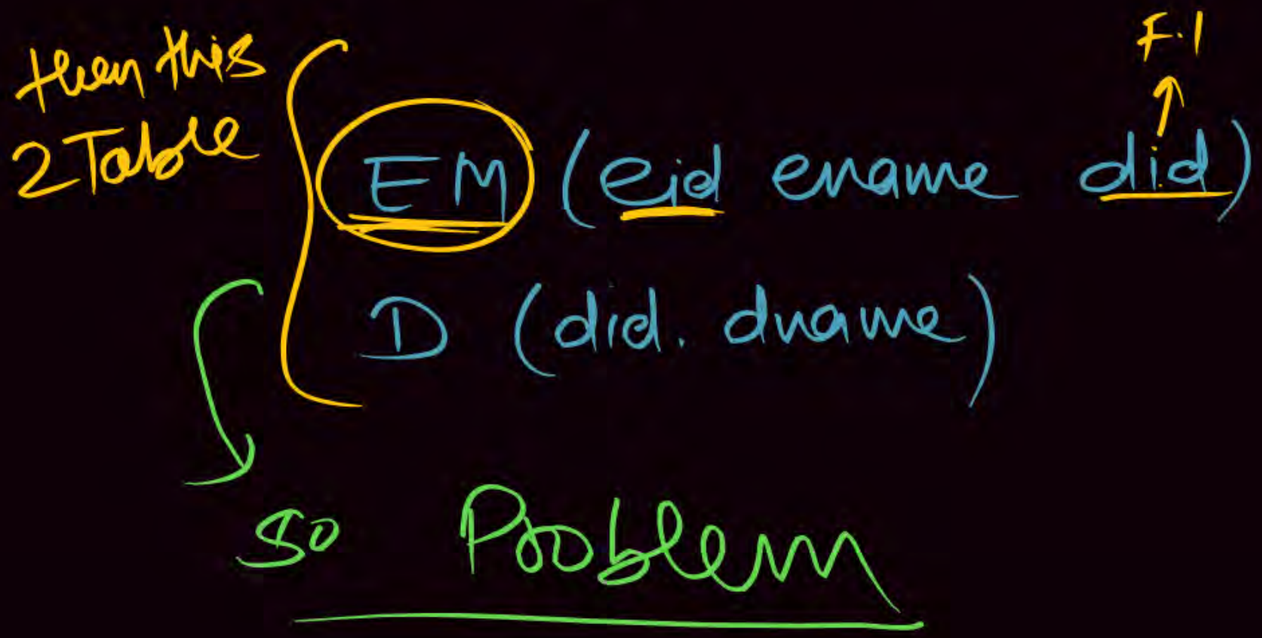
e_1	A	d_1
e_1	A	d_2
e_2	B	d_2
e_1	C	d_3
e_1	D	Null

Not key

Not valid as did is key of E_M
(Partial Participation)
[lost at E side]



if we try to Merge [Combined at One Side in One to Many]

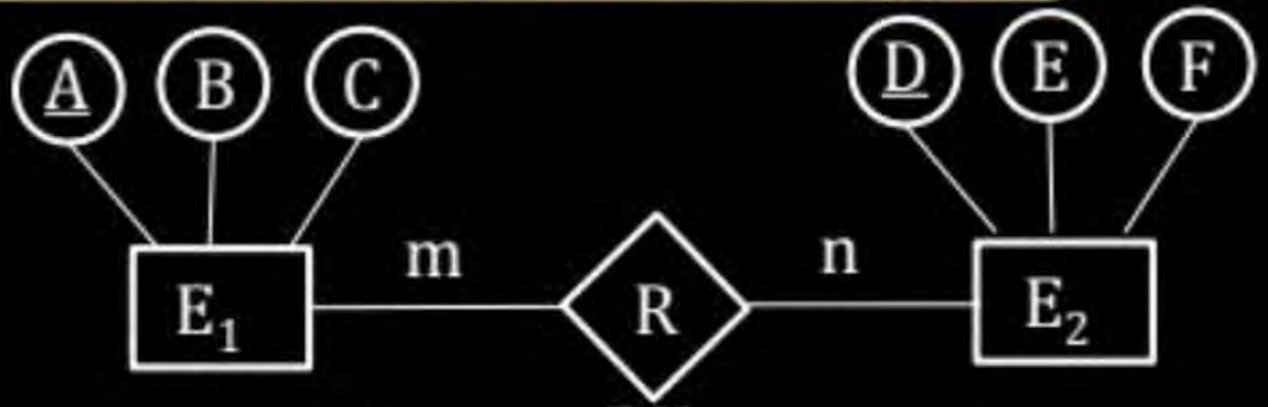


Disadvantage:

1) Data Redundancy Occurs
   eid → ename
   Not Super Key(S.K)

2) Partial Participation will be lost
   [Not possible to insert employees who are not manager of dept.]

Many : Many Relationship:



F.K

E_1 (A B C)

a_1
a_2
a_3
a_4
⇑
key

R (A D)

a_1	d_1
a_2	d_2
a_2	d_2
⇑	⇑
Not key	

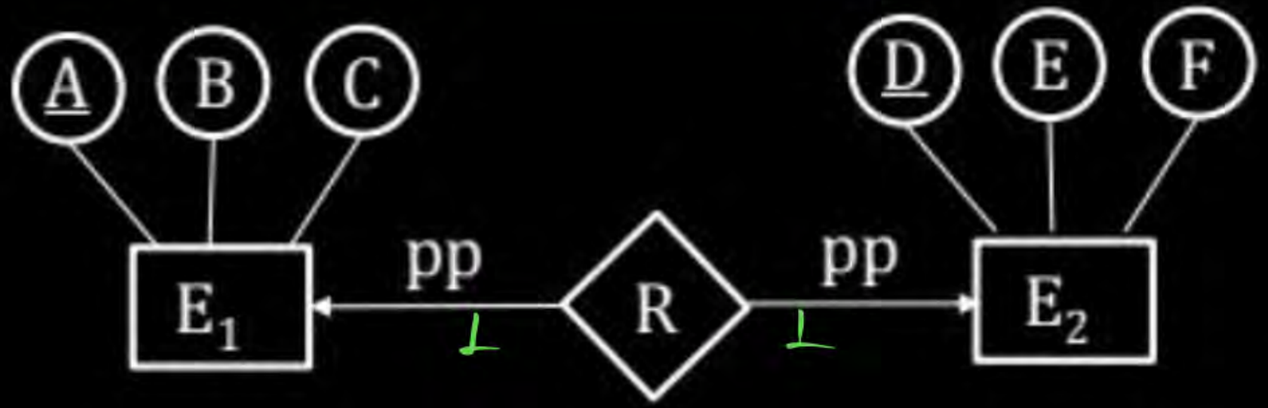
E_2 (D E F)

d_1
d_2
d_3
⇑
key

E_1(A B C)
R(A D) → 2 F.K
E_2(D E F)
F.K

Minimum 3 relational table required and 2 foreign key required.
M:N relationship set not allowed to merge with any entity set.

One : One Relationship:



E_1 (A B C)

a_1
a_2
a_3
a_4

key

[A→BC]

R (A D)

a_1 d_2
a_2 d_3
a_3 d_4

key key

[A→D
D→A]

E_2 (D E F)

d_1
d_2
d_3
d_4

key

[D→EF]

E_1, E_2 entity sets & R relationship set related between E_1 and E_2 with 1:1 cardinality and partial participation(pp) at both side.

F.K

E_1(ABC) & RE_2(DEFA)

OR

F.K

ER(ABCD) & E_2(DEF)

Q In 1:1 & Partial Participation, Why Not Merge into Only One Single Table.

If all merge with single Table:

E_1RE_2

A	B	C	D	E	F
a_1	-	-	d_2	-	-
a_2	-	-	d_3	-	-
a_3	-	-	d_4	-	-
a_4	-	-	Null	Null	Null
Null	NULL		d_1	-	-

Candidate key = {A, D}

No Candidate key is present, & No primary key

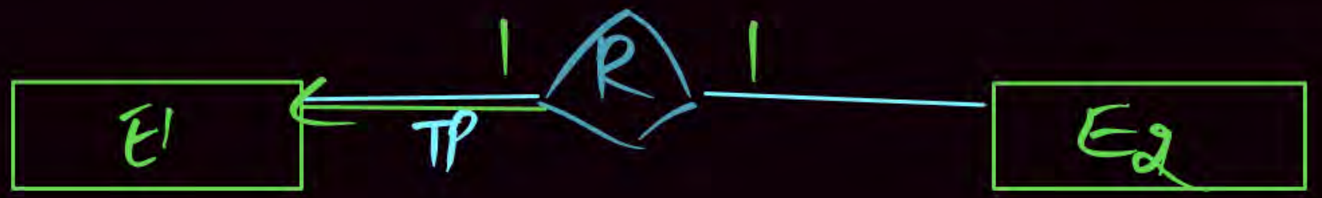
A relational table in which no attribute having "NOT NULL" values are "NOT" allowed in RDBMS. So,

- minimum 2 Relation Table Required and 1 Foreign key.

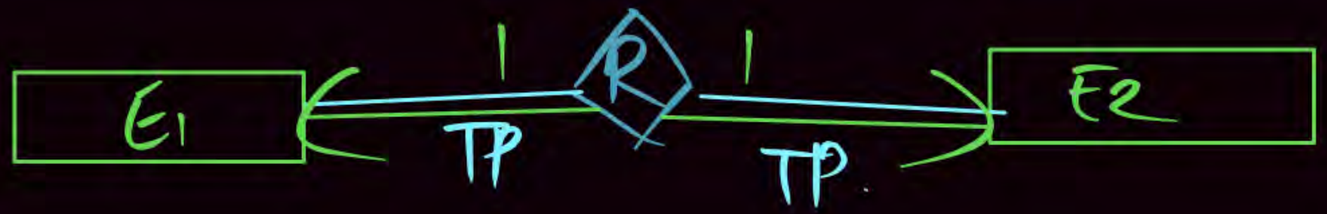
Q If Total Participation in 1:1 then WHAT ?

One to One [1:1]

E1 R & E2
OR
E1 & E2 R.
2 Table

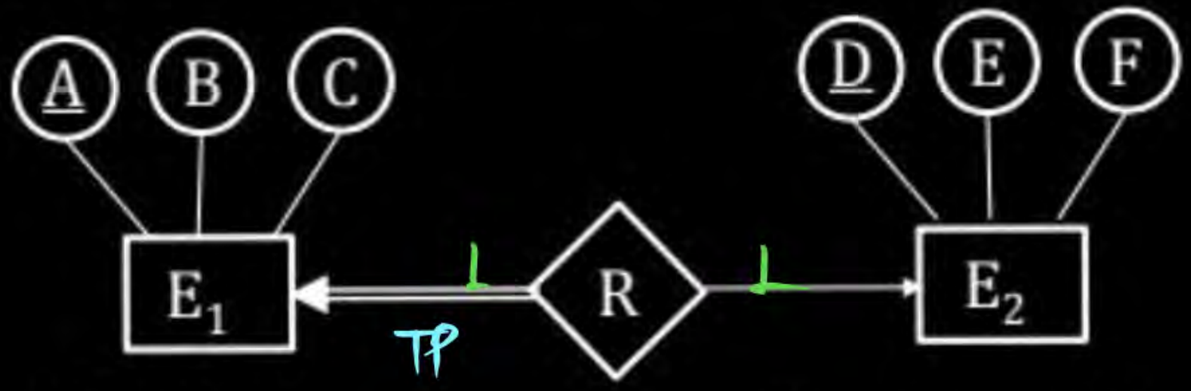


1 Table

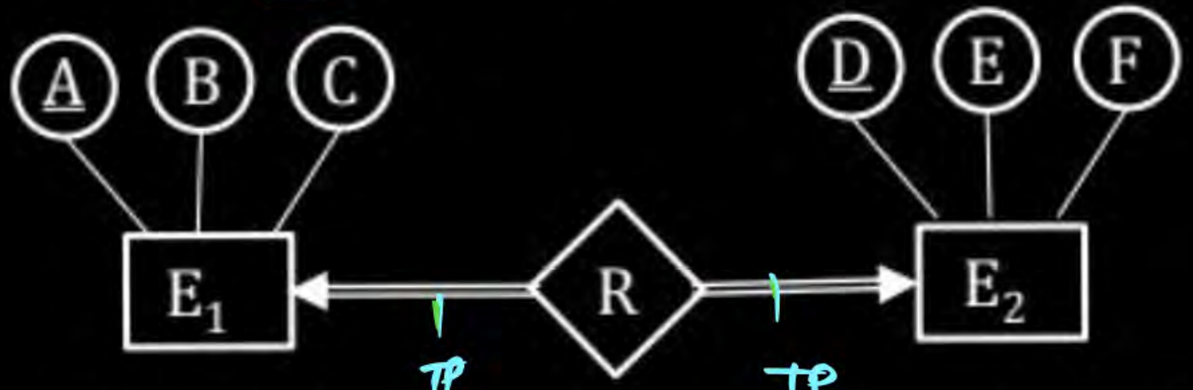


1 Table

E_1 E_2 Entity set R Rel set between E_1E_2
With 1:1 mapping and at least one end having total participation.



E_1 R E_2 (A B C D E F)

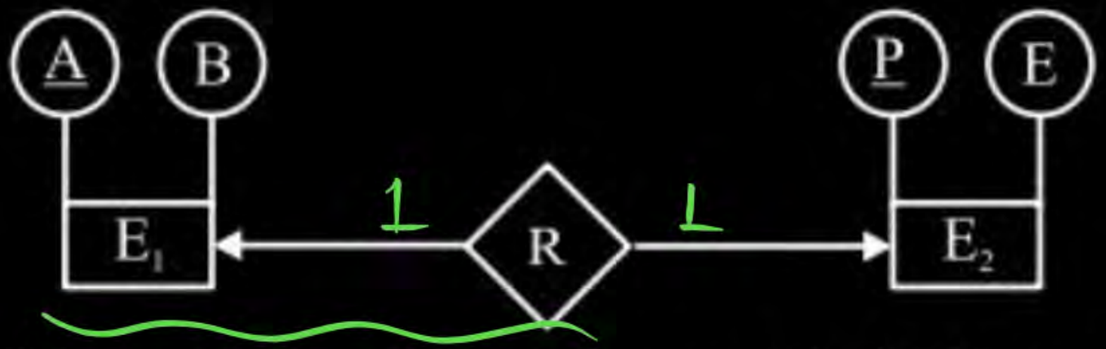


E_1 R E_2 (A B C D E F)

Primary Key

UNIQUE & NOT NULL (Alternative Key)

Q.



70% participation at E_1 end & 40% participation at E_2 end.
Which is best possible design?

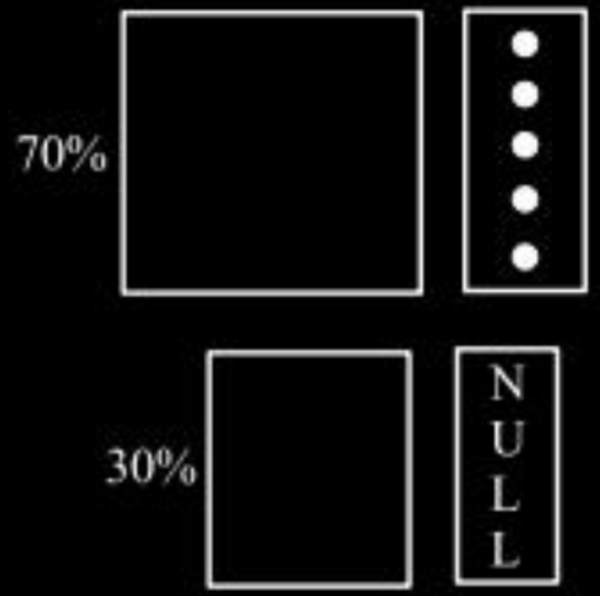
A. E_1 E_2 entity set kept separate with F.K at E_1

B. E_1 E_2 entity set kept separate with F.K at E_2

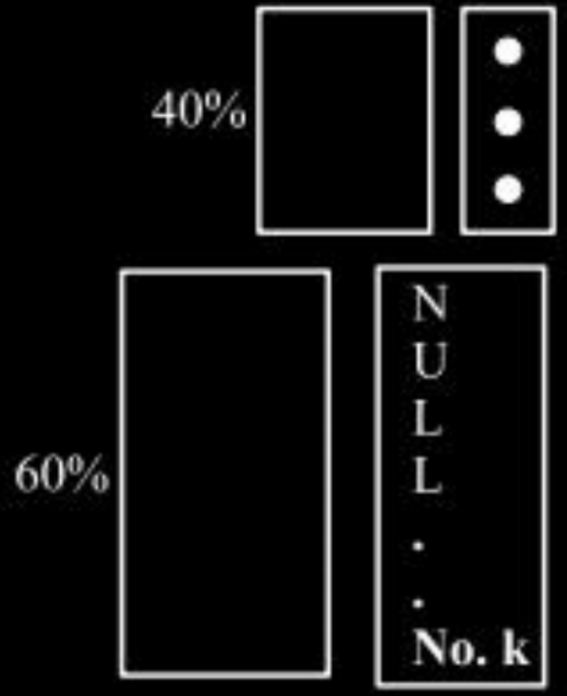
C. E_1 E_2 entity set kept separate with F.K at both E_1 E_2

D. E_1 E_2 merges into single table with No F.K.

(a) E_1 R (A B D) E_2 (D E)

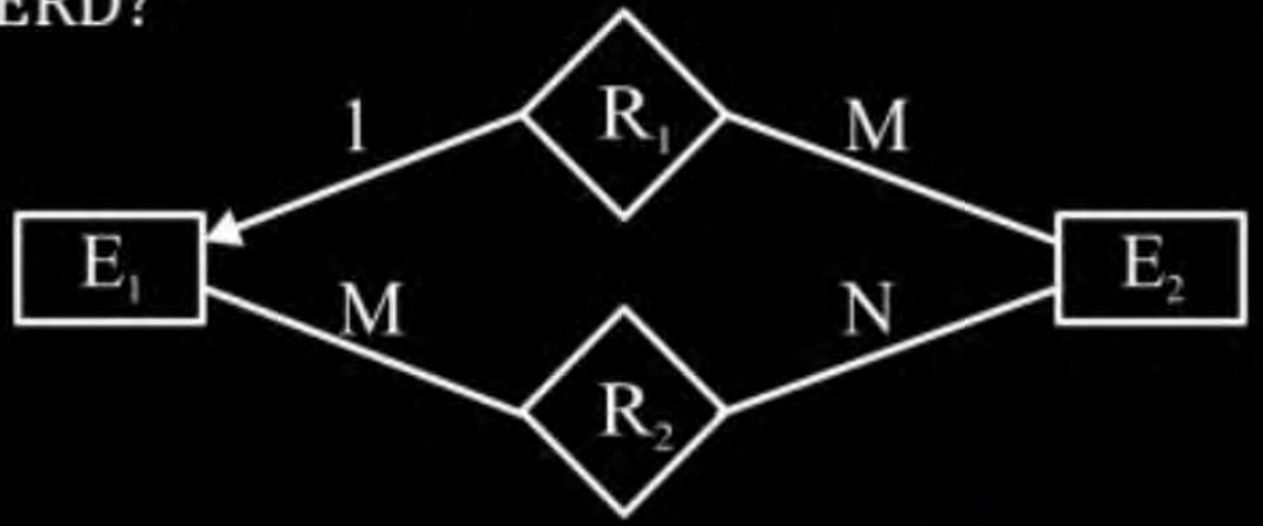


(b) E1(A, B) E_2 (D E A)



Q.

E_1 E_2 entity set R_1 R_2 Relationship set related between E_1 and E_2 with 1:M and M : N mapping min Relational Table required in ERD?



A. 2

B. 3

C. 4

D. 5

Q.

$E_1E_2E_3$ entity set R_1 Relation between E_1 E_2 with 1 : M, R_2 Relations between E_2 E_3 with M : 1, R_3 Relationship between E_1 & E_3 with M : N

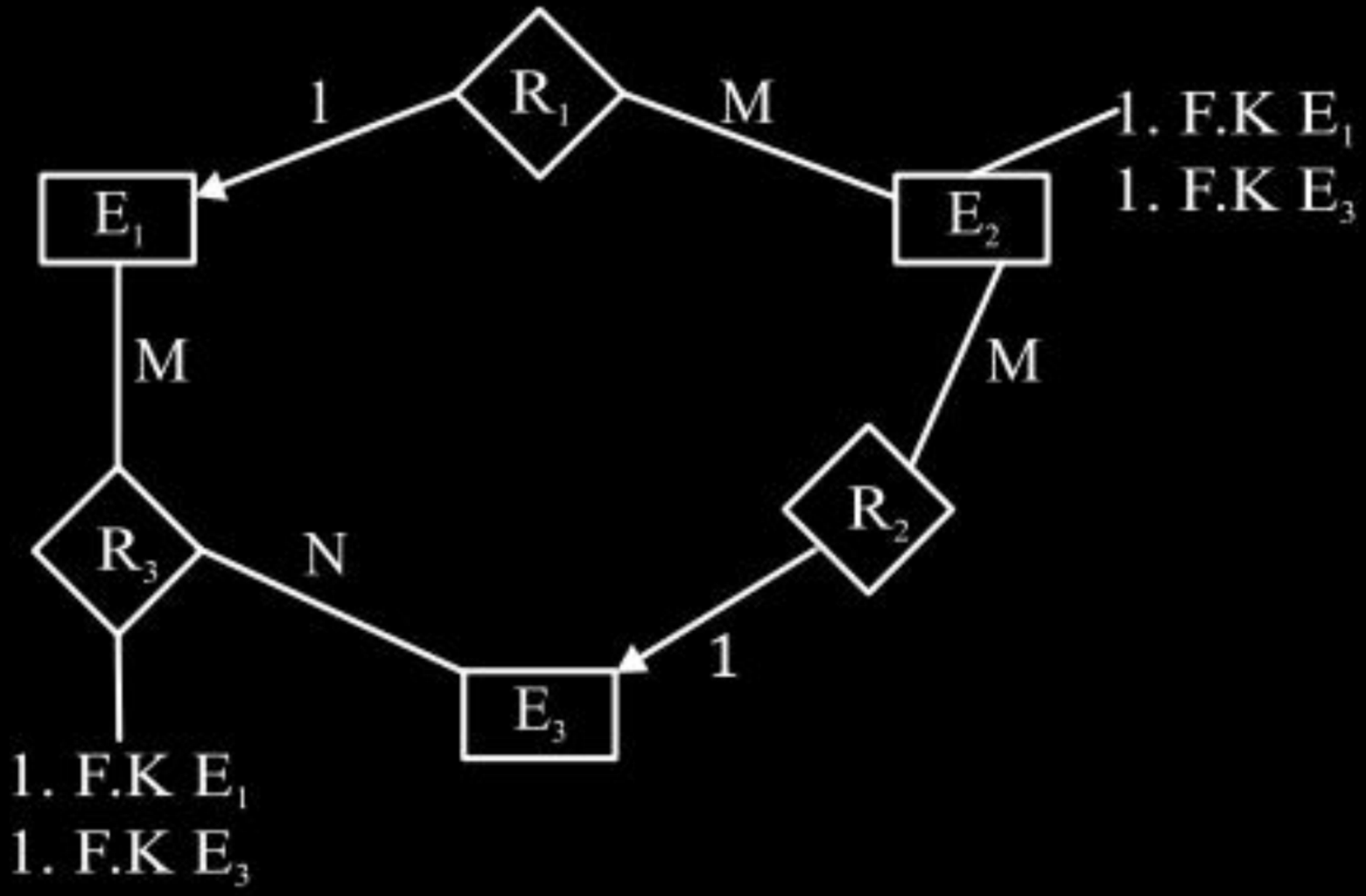
How many minimum relational tables required for given ERD?

A. 2

B. 3

C. 4

D. 5



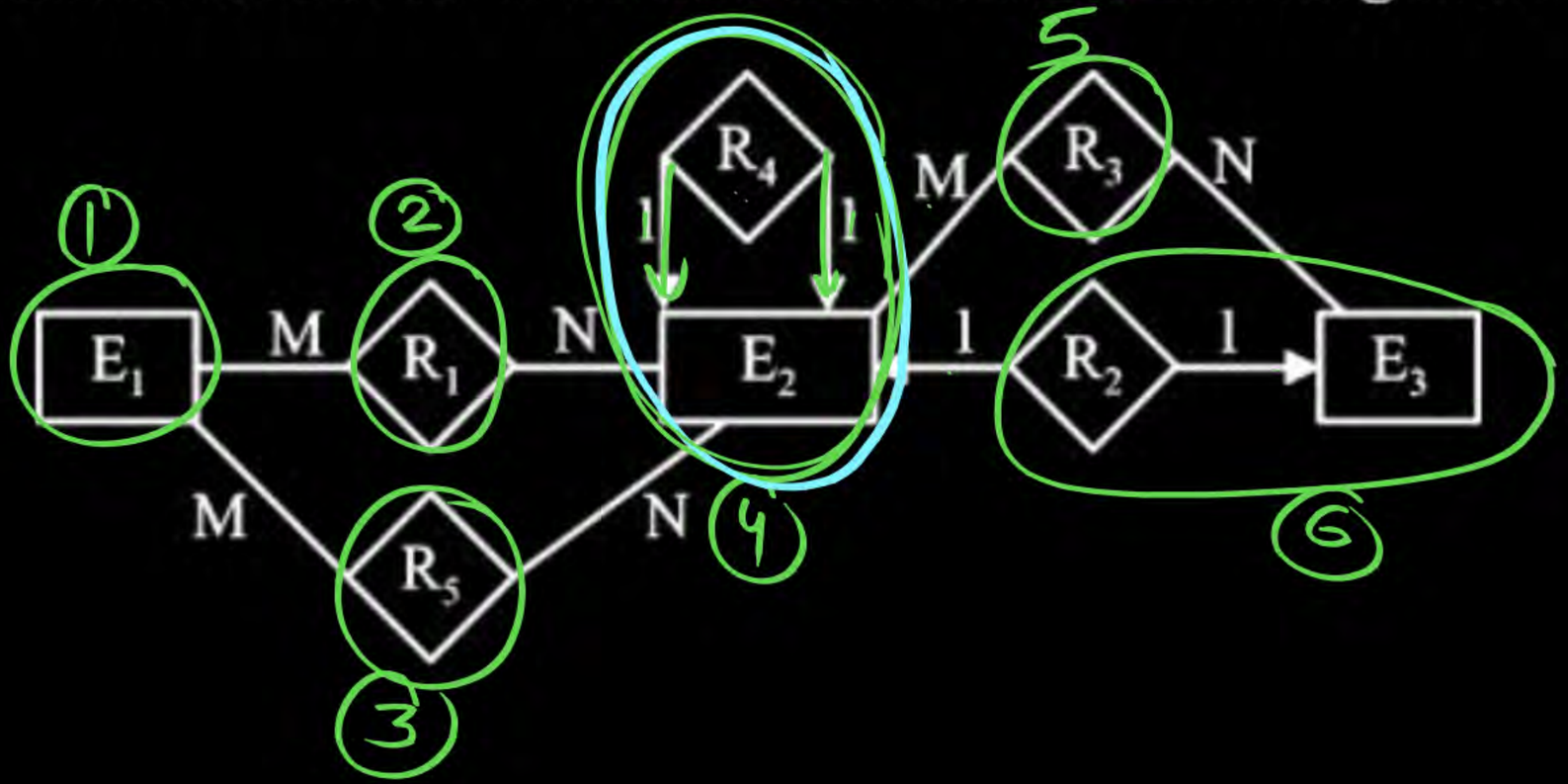
Min 4 Rel Table and 4 Foreign key.

Q.

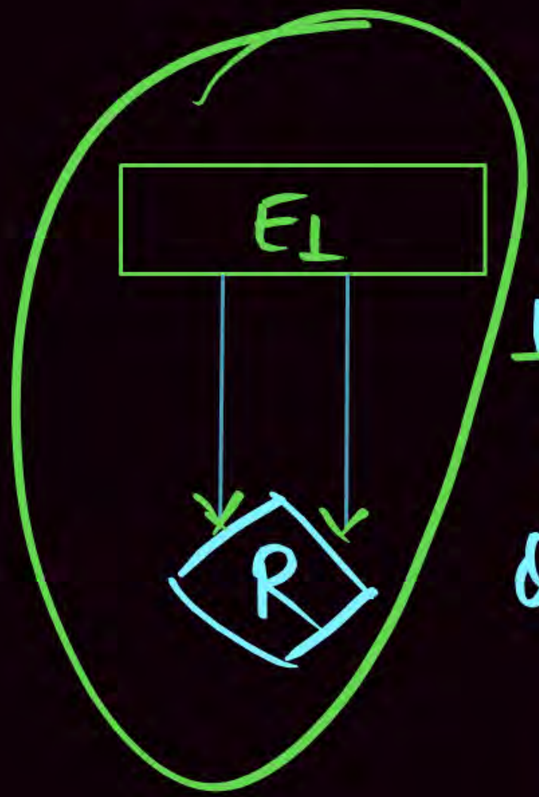
[NAT]

Consider the following ER diagram

Total number of RDBMS table in the above diagram?

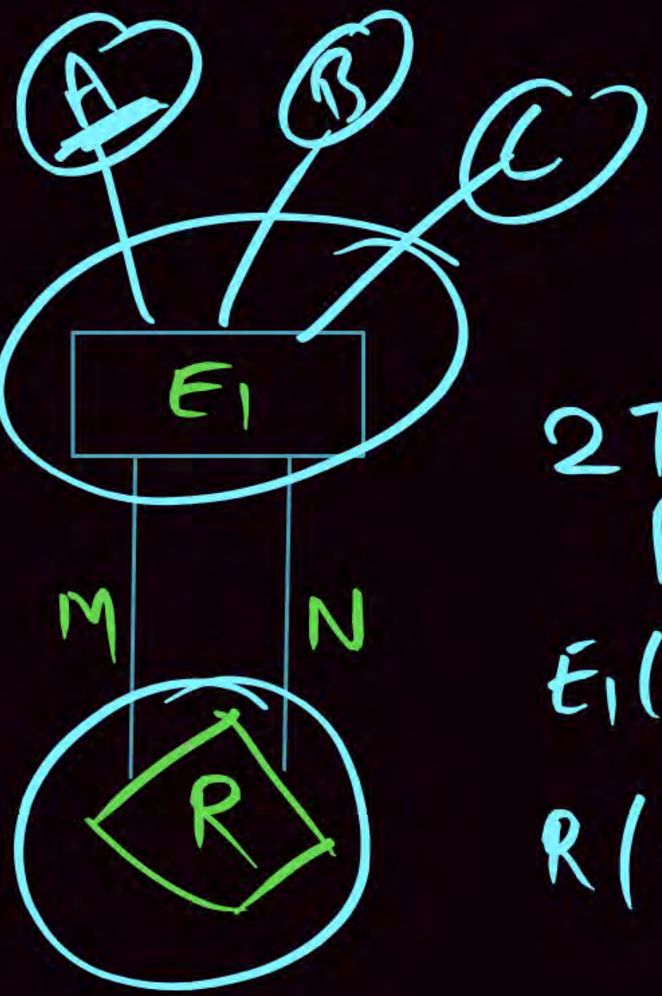


Recursive Entity Set



1:M , M:1

1:1 then only one Table Required.



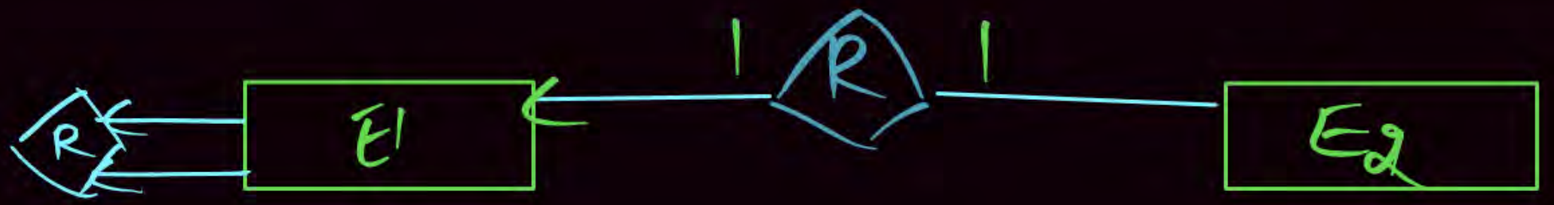
2 Table Required

$E_1(\underline{A}BC)$

$R(A_1 A_2)$

One to One [1:1]

E1R & E2
OR
E1 & E2R.
2 Table



2 Table.

3 Table.
E1
R
E2R1

Self Referential Relationship set:

[Recursive entity set]
Entities of entity set (E) related to some other entity of same entity set (E)

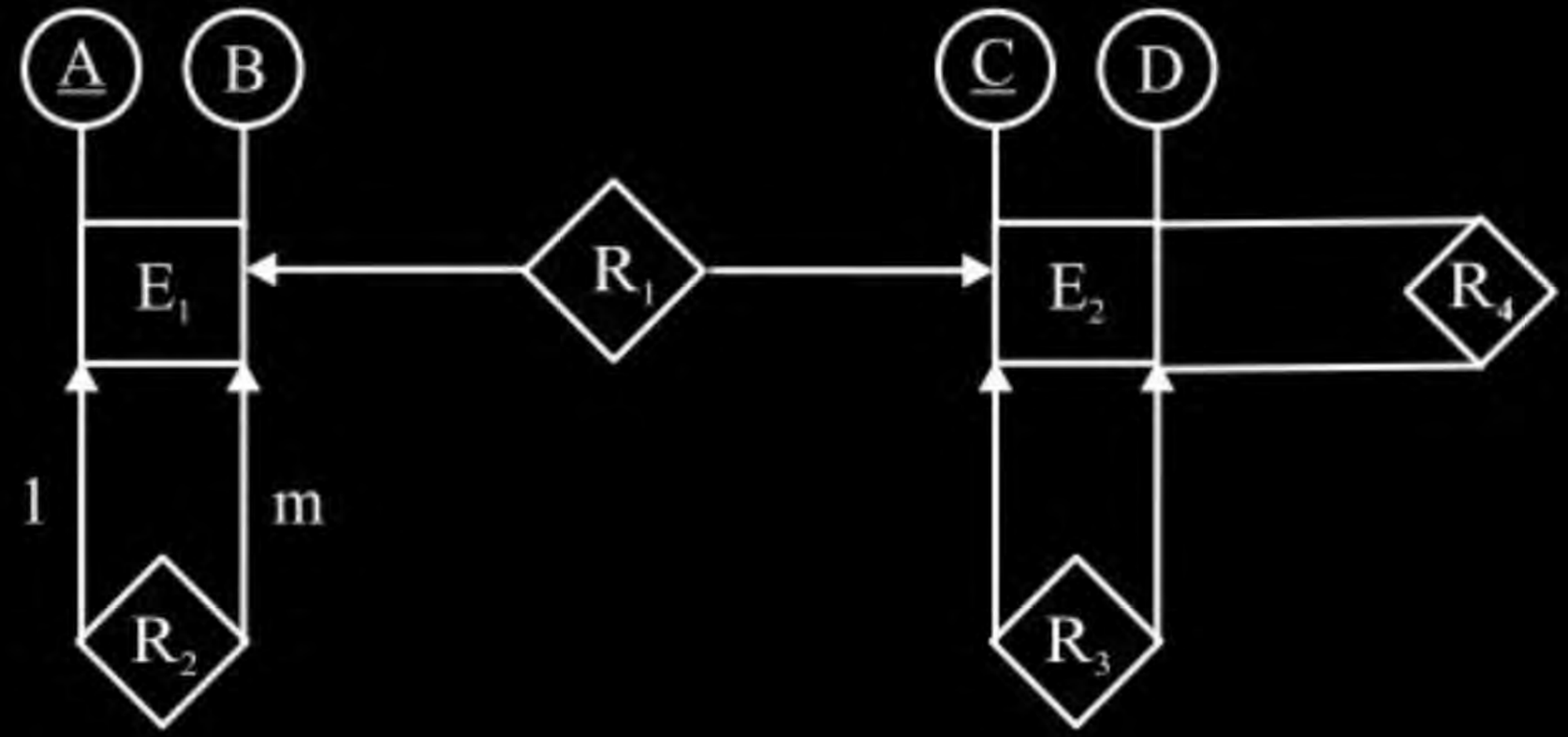
} Recursive Entity set

} Self Referential Relationship set.

- Also Binary Relationship set
- 1:M, M :1, M :1, 1:1, N: N be any of the relationship

if M : N One More Table along with Entity set table.

Q.



(I) $E_1\ R_2\ (\underline{A}\quad B\quad A)$

(II) $E_2\ R_1\ R_3\ (\underline{C}\quad D\quad A\quad C)$

(III) $R_4\ C_3\ C_4$

Q.

[MCQ]

Consider the following ER diagram:

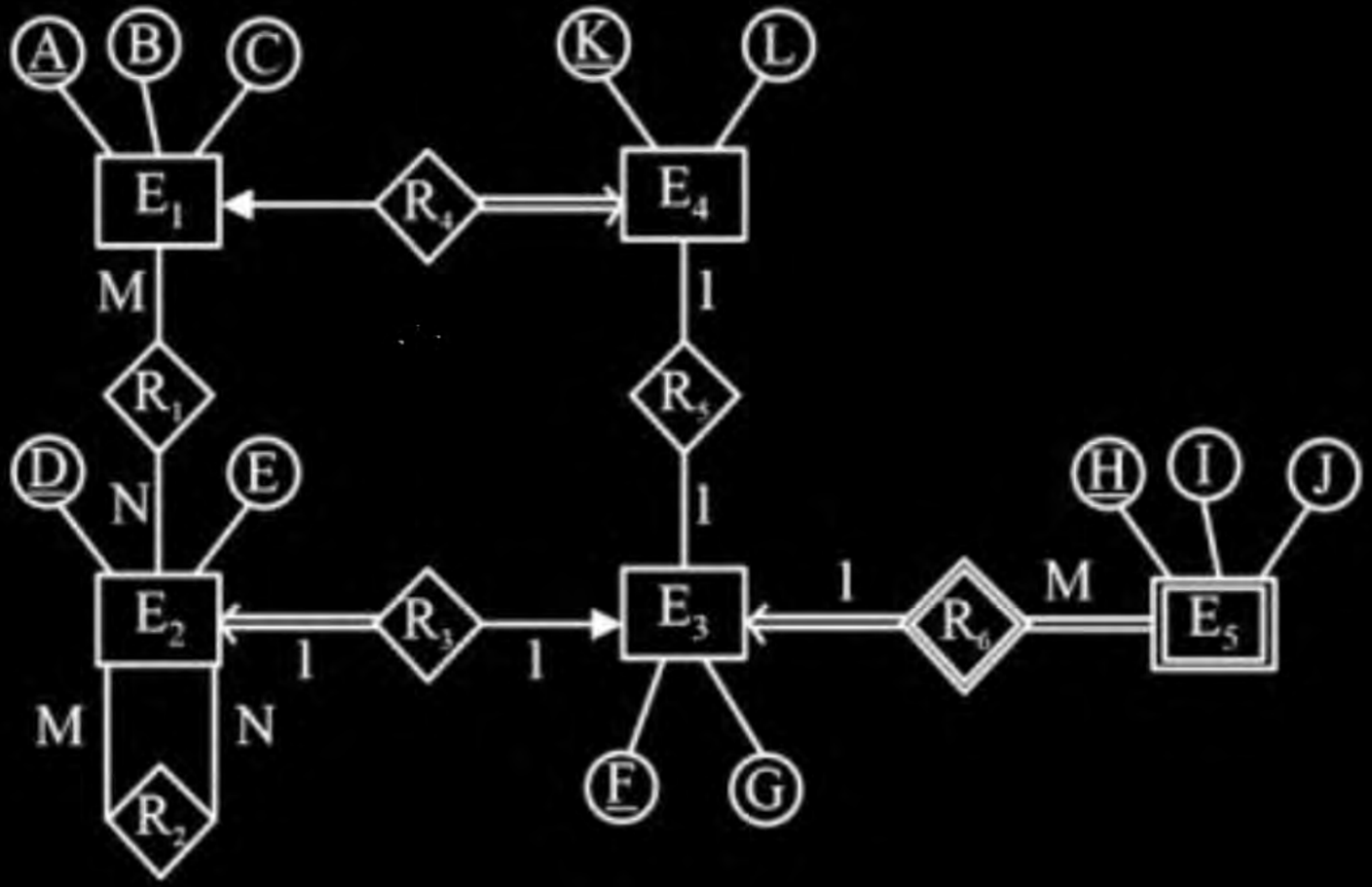
How many total attributes required for the minimized relations of the above ER diagram?

A. 14

B. 15

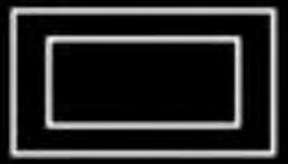
C. 18

D. None of these

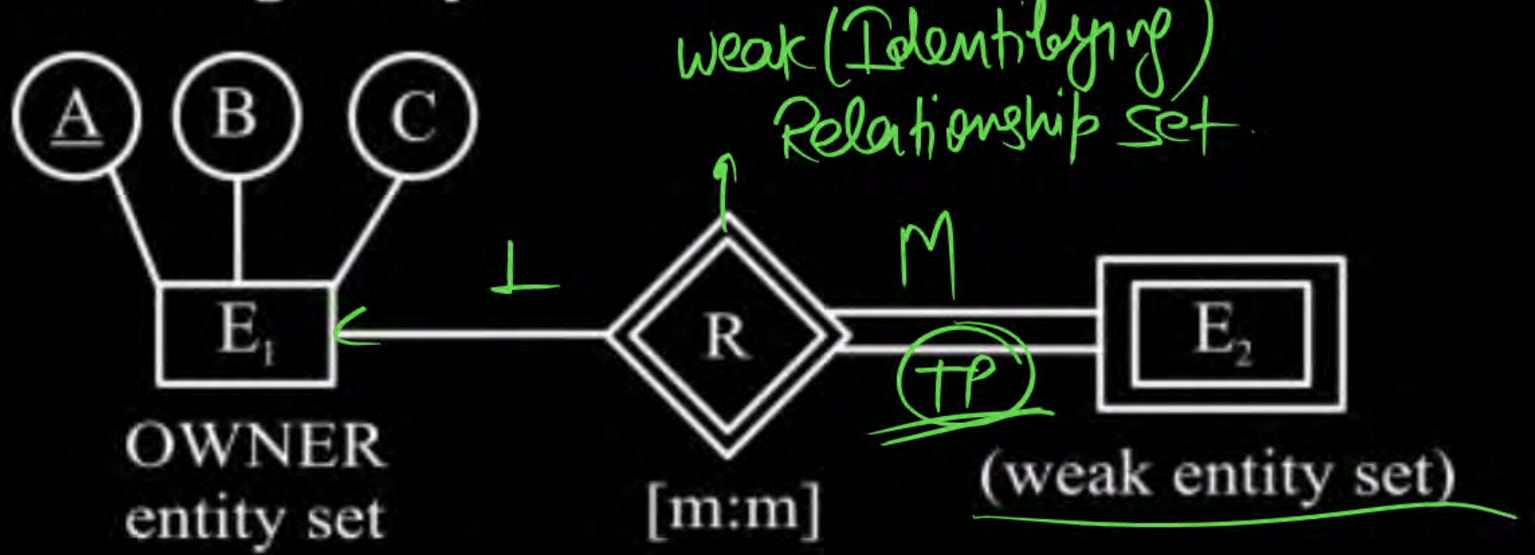


WEAK ENTITY SET:

⇒ Entity set with no key.
[Attributes of weak entity set not sufficient to differentiate entities uniquely]

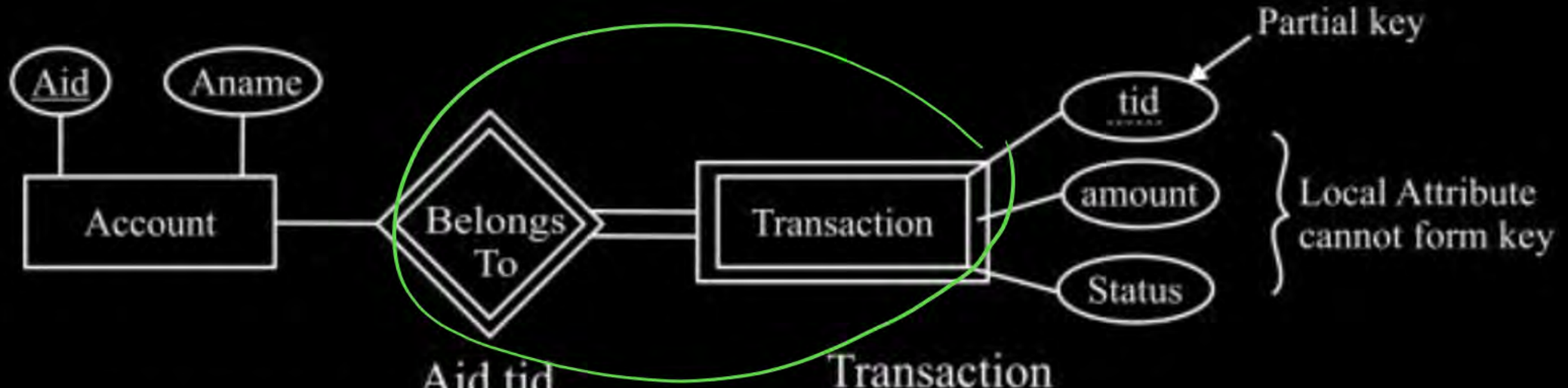
⇒ 

⇒ For each weak entity set there must be OWNER entity set which is strong entity.



⇒ Entities of weak entity set are depending entities.

Ex.



Aid tid

Aid	Aname
A_1	
A_2	
A_3	
A_4	

Aid	tid
A_1	t_1
A_2	t_1
A_2	t_2
A_3	t_2

⇑

[1: m]
Ambiguity

Transaction

tid	amount	Status
t_1	5000	Debit
t_1	4000	Credit
t_2	5000	Debit
t_2	5000	Debit

- Relationship set between weak entity set and identifier entity is also weak relationship set.

- Participation towards weak entity set end must be TOTAL PARTICIPATION.
- Mapping between identifier set must be one: many (1: m)
- RDBMS Design:
  Transaction belongs (Aid tid amount state)
  Account (Aid Aname)

NOTE: Weak entity set and multivalued attributes allowed to represent in ERD, but NOT allowed in RDBMS Table.

Q.

Consider the following database schedule with two transactions, T_1 and T_2.

$S = r_2(X); r_1(X); r_2(Y); w_1(X); r_1(Y); w_2(X); a_1; a_2$

where $r_i(Z)$ denotes a read operation by transaction T_i on a variable Z, $w_i(Z)$ denotes a write operation by T_i on a variable Z and a_i denotes an abort by transaction T_i

Which one of the following statements about the above schedule is TRUE?

[MCQ:2016–2M]

A. S is non-recoverable

B. S is recoverable, but has a cascading abort

C. S does not have a cascading abort

D. S is strict

Q.

Let S be the following schedule of operations of three transactions T_1, T_2 and T_3 in a relational database system:

$$R_2(Y), R_1(X), R_3(Z), R_1(Y), W_1(X), R_2(Z), W_2(Y), R_3(X), W_3(Z)$$

Consider the statements P and Q below:

P: S is conflict-serializable.

Q: If T_3 commits before T_1 finishes, then S is recoverable.

Which one of the following choices is correct?

[MCQ: 2021-2M]

A. Both P and Q are true.

B. P is true and Q is false.

C. P is false and Q is true.

D. Both P and Q are false.

MCQ **Q.1**

In an Entity-Relationship (ER) model, suppose R is a many-to-one relationship from entity set E1 to entity set E2. Assume that E1 and E2 participate totally in R and that the cardinality of E1 is greater than the cardinality of E2.

Which one of the following is true about R?

[GATE-2018-CS: 1M]

A. Every entity in E1 is associated with exactly one entity in E2.

B. Some entity in E1 is associated with more than one entity in E2.

C. Every entity in E2 is associated with exactly one entity in E1.

D. Every entity in E2 is associated with at most one entity in E1.

NAT **Q.2**

Consider an Entity-Relationship (ER) model in which entity sets E_1 and E_2 are connected by an m: n relationship R_{12} . E_1 and E_3 are connected by a 1: n (1 on the side of E_1 and n on the side of E_3) relationship R_{13}.

E_1 has two single-valued attributes a_{11} and a_{12} of which a_{11} is the key attribute. E_2 has two single valued attributes a_{21} and a_{22} of which a_{21} is the key attribute. E_3 has two single valued attributes a_{31} and a_{32} of which a_{31} is the key attribute. The relationships do not have any attributes.

If a relational model is derived from the above ER model, then the minimum number of relations that would be generated if all the relations are in 3 NF is_____

[GATE-2015-CS: 2M]

MCQ **Q.3**

Consider the following statements S1 and S2 about the relational data model:

S1: A relation scheme can have at most one foreign key.

S2: A foreign key in a relation scheme R cannot be used to refer to tuples of R.

Which one of the following choices is correct?

[GATE-2021-CS: 1M]

A. Both S1 and S2 are true

B. S1 is true and S2 is false

C. S1 is false and S2 is true

D. Both S1 and S2 are false

NAT Q.4

Consider the following tables T1 and T2.

In table T1, **P** is the primary key and **Q** is the foreign key referencing **R** in table T2 with on-delete cascade and on-update cascade. In table T_2, **R** is the primary key and **S** is the foreign key referencing **P** in table T1 with on-delete set NULL and on-update cascade. In order to delete record ⟨3,8⟩ from table T1, the number of additional records that need to be deleted from table T1 is

T_1	
P	**Q**
2	2
3	8
7	3
5	8
6	9
8	5
9	8

T_2	
R	**S**
2	2
8	3
3	2
9	7
5	7
7	2

[GATE-2017-CS: 1M]

MCQ Q.5

Let E_1 and E_2 be two entities in an E-R diagram with simple single-valued attributes. R_1 and R_2 are two relationships between E_1 and E_2, where R_1 is one-to-many and R_2 is many-to-many. R_1 and R_2 do not have any attributes of their own. What is the minimum number of tables required to represent this situation in the relational model?

[GATE-2005]

A 2

B 3

C 4

D 1

MCQ Q.6

Consider the entities 'hotel room', and 'person' with a many to many relationship 'lodging' as shown below:

If we wish to store information about the rent payment to be made by person (s) occupying different hotel rooms, then this information should appear as an attribute of [GATE-2005]

A Person

B Hotel Room

C Lodging

D None of these

MCQ Q.7

Amongst the ACID properties of a transaction, the 'Durability' property requires that the changes made to the database by a successful transaction persist

[GATE-2005]

A. Except in case of an Operating System crash

B. Except in case of a Disk crash

C. Except in case of a power failure

D. Always, even if there is a failure of any kind

MCQ **Q.8**

Consider the following schedules involving two transactions. Which one of the following statements is TRUE?

$S_1 : r_1(X); r_1(Y); r_2(X); r_2(Y); w_2(Y); w_1(X)$

$S_2 : r_1(X); r_2(X); r_2(Y); w_2(Y); r_1(Y); w_1(X)$ [GATE-2007]

A. Both S_1 and S_2 are conflict serializable.

B. S_1 is conflict serializable and S_2 is not conflict serializable.

C. S_1 is not conflict serializable and S_2 is conflict serializable.

D. Both S_1 and S_2 are not conflict serializable.

MCQ Q.9

Consider the following log sequence of two transactions on a bank account, with initial balance 12000, that transfer 2000 to a mortgage payment and then apply a 5% interest.

1. T1 start
2. T1 B old=12000 new=10000
3. T1 M old=0 new=2000
4. T1 commit
5. T2 start
6. T2 B old=10000 new=10500
7. T2 commit

Suppose the database system crashes just before log record 7 is written. When the system is restarted, which one statement is true of the recovery procedure?

[GATE-2006]

A We must redo log record 6 to set B to 10500

B We must undo log record 6 to set B to 10000 and then redo log records 2 and 3.

C We need not redo log records 2 and 3 because transaction T1 has committed.

D We can apply redo and undo operations in arbitrary order because they are idempotent

MCQ Q.10

Which one of the following statements about normal forms is FALSE?

[GATE-2005]

A. BCNF is stricter than 3NF

B. Lossless, dependency-preserving decomposition into 3NF is always possible

C. Lossless, dependency-preserving decomposition into BCNF is always possible

D. Any relation with two attributes is in BCNF

MCQ Q.11

A table has fields F_1, F_2, F_3, F_4, F_5 with the following functional dependencies

- $F_1 \rightarrow F_3$, $F_2 \rightarrow F_4$, $(F_1 . F_2) \rightarrow F_5$

In terms of Normalization, this table is in

[GATE-2005]

A 1 NF

B 2 NF

C 3 NF

D none

MCQ Q.12

Consider two tables in a relational database with columns and rows as follows:

Table: Student

ROLL_NO	NAME	DEPT_ID
1	ABC	1
2	DEF	1
3	GHI	2
4	JKL	3

Table: Department

DEPT_ID	DEPT_NAME
1	A
2	B
3	C

Roll_no is the primary key of the Student table, Dept_id is the primary key of the Department table and Student.Dept_id is a foreign key from Department.Dept_id
What will happen if we try to execute the following two SQL statements?

i. update Student set Dept_id = Null where Roll_on = 1

ii. update Department set Dept_id = Null where Dept_id = 1

[GATE-2004]

A Both (i) and (ii) will fail

B (i) will fail but (ii) will succeed

C (i) will succeed but (ii) will fail

D Both (i) and (ii) will succeed

MCQ Q.13

Which of the following scenarios may lead to an irrecoverable error in a database system?

[GATE-2003]

A. A transaction writes a data item after it is read by an uncommitted transaction

B. A transaction reads, a data item after it is read by an uncommitted transaction

C. A transaction reads a data item after it is written by a committed transaction

D. A transaction reads a data item after it is written by an uncommitted transaction

MCQ_85 Q.14

Consider the following functional dependencies in a database.

Date_of_Birth→Age

Age → Eligibility

Name → Roll number

Roll_number → Name

Course_number → Course name

Course_number → Instructor

(Roll_number, Course_number) → Grade

The relation (Roll_number, Name, Date_of_birth, Age) is

[GATE-2003]

A in second normal form but not in third normal form

B in third normal form but not in BCNF

C in BCNF

D none of tire above

MCQ Q.15

Consider three data items D1, D2, and D3, and the following execution schedule of transactions T1, T2, and T3. In the diagram, R(D) and W(D) denote the actions reading and writing the data item D respectively,

[GATE-2003]

T1	T2	T3
	R(D3);	
	R(D2);	
	W(D2);	
		R(D2);
		R(D3);
R(D1);		
W(D1);		
		W(D2);
		W(D3);
	R(D1);	
R(D2);		
W(D2);		
	W(D1);	

Which of the following statements is correct?

A The schedule is serializable as T2; T3; T1

B The schedule is serializable as T2 ; T1 ; T3

C The schedule is serializable T3 ; T2 ; T1

D The schedule is not serializable

Descriptive Q.16

For relation R =(L, M, N, O, P), the following dependencies hold:
$M \rightarrow O$, $NO \rightarrow P$, $P \rightarrow L$, and $L \rightarrow MN$
R is decomposed into R_1=(L, M, N, P) and R_2 = (M, O).

a Is the above decomposition a lossless-join decomposition? Explain.
b Is the above decomposition dependency-preserving ? If not ,list all the dependencies that are not preserved.
c. What is the highest normal form satisfied by the above decomposition? [GATE-2002]

MCQ **Q.17**

Consider a schema R(A,B,C,D) and functional dependencies $A \rightarrow B$ and $C \rightarrow D$.

Then the decomposition of R into $R_1(A, B)$ and $R_2(C, D)$ is

[GATE-2001]

(A) Dependency preserving and lossless join

(B) Lossless join but not dependency preserving

(C) Dependency preserving but not lossless join

(D) Not dependency preserving and not lossless join

MCQ Q.18

For a database relation R(a, b, c, d), where the domains a, b, c, d include only atomic values, only the following functional dependencies and those that can be inferred from them hold:

- $a \rightarrow c$
- $b \rightarrow d$

The relation is [GATE-1997]

(A) in first normal form but not in second normal form

(B) in second normal form but not in first normal form

(C) in third normal form

(D) none of the above

Descriptive Q.19

Consider the relation scheme R(A,B,C) with the following functional dependencies:

- $A, B \rightarrow C$
- $C \rightarrow A$

(a) Show that the scheme R is in Third Normal Form (3NF) but not in Boyce-Codd Normal Form (BCNF).

(b) Determine die minimal keys of relation R.

[GATE-1995]

Descriptive Q.20

Consider the following database relations containing the attributes

- Book-id
- Subject_Category_of_book
- Name_of_Author
- Nationality_of_Author

with Book_id as the primary key

a. What is the highest normal form satisfied by this relation?

b. Suppose the attributes Book_title and Author_address are added to the relation, and the primary key is changed to {Name_of _Author, Book _title}, What will be the highest normal form satisfied by the relation?

[GATE-1998]

Total GATE
130 + PYQ

Query lang.
File org & Indexing

72
+20
92 GATE PYQ

100+ Abbrox

THANK YOU!