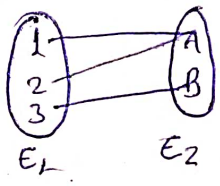
Data Base Management System

Q.1 In an Entity-relationship (ER) model, suppose R is many to one relationship from entity set E_1 to entity set E_2. Assume that E_1 and E_2 participate totally in R and that the cardinality of E_1 is greater than the cardinality of E_2. Which one of the following is true about R?



(A) Every entity in E_1 is associated with exactly one entity in E_2.

(B) Some entity in E_1 is associated with more than one entity in E_2.

(C) Every entity in E_2 is associated with exactly one entity in E_1.

(D) Every entity in E_2 is associated with at most one entity in E_1. **[GATE-2018]**

Q.2 An ER model of a database consists of entity types A and B. These are connected by a relationship R which does not have its own attribute. Under which one of the following conditions, can the relational table for R be merged with that of A?

(A) Relationship R is one-to-many and the participation of A in R is total.

(B) Relationship R is one-to-many and the participation of A in R is partial.

(C) Relationship R is many-to-one and the participation of A in R is total.

(D) Relationship R is many-to-one and the participation of A in R is partial. **[GATE-2017]**

Q.3 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 T2, 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 0 Ans **[GATE-2017]**

T1		T2	
P	Q	R	S
2	2	2	2
~~3~~	~~8~~	8	~~3~~ NULL
7	3	3	2
5	8	9	7
6	9	5	7
8	5	7	2
9	8		

Q.4 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 attributes. E_3 has two single-valued attributes a_{31} and a_{32} of which a_{31} is the key attribute. The relationship do not have any attributes.

If a relational model is the derived from the above ER model, then the minimum number of relations that would be generated if all the relations are in 3NF is _____. **[GATE-2015]**

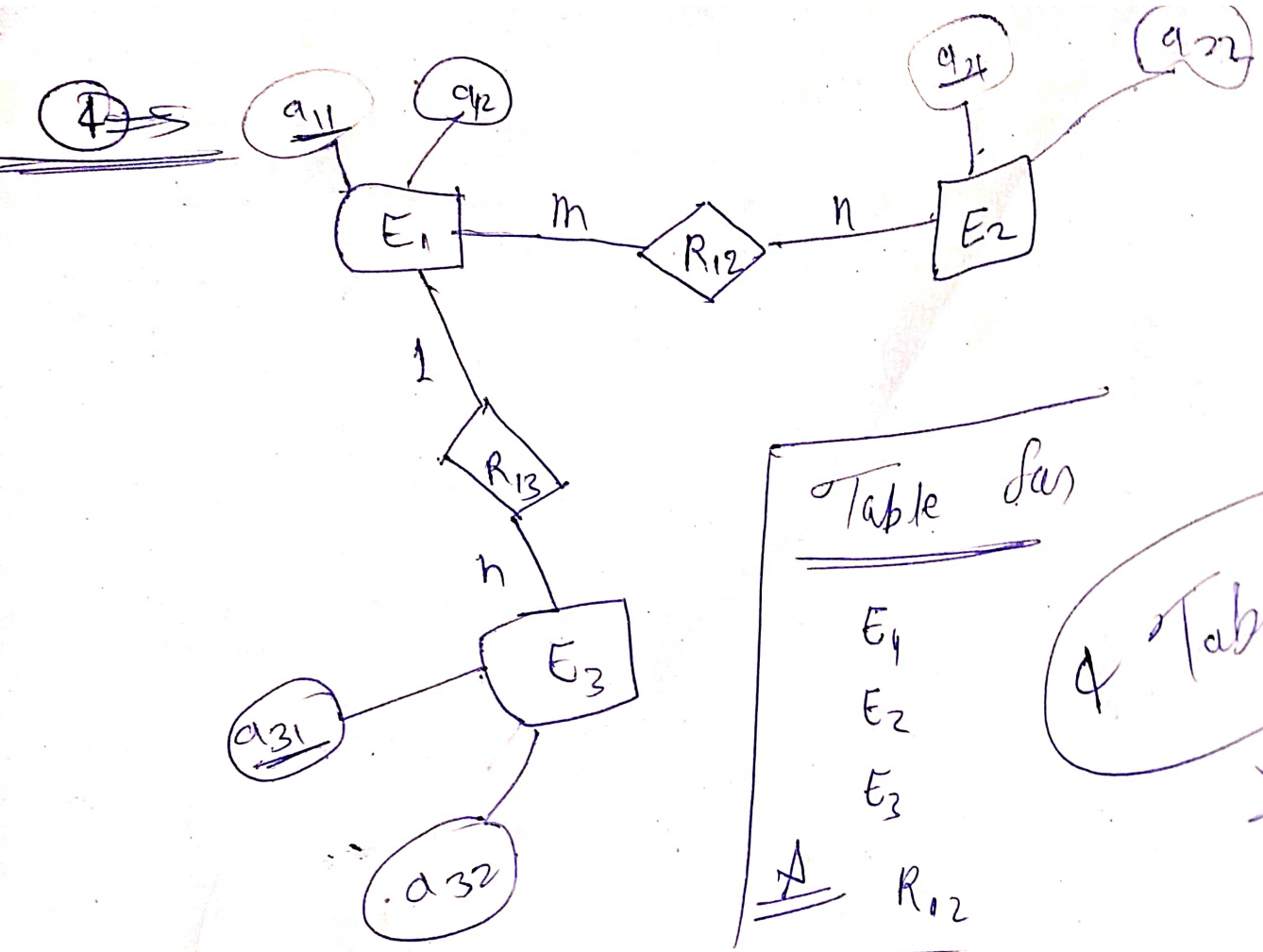


Table Sas

E_1

E_2

E_3

A R_{12}

4 Tables

Ans

Q.5 Given the basic ER and relational models, which of the following is **INCORRECT?**

(A) An attribute of an entity can have more than one value

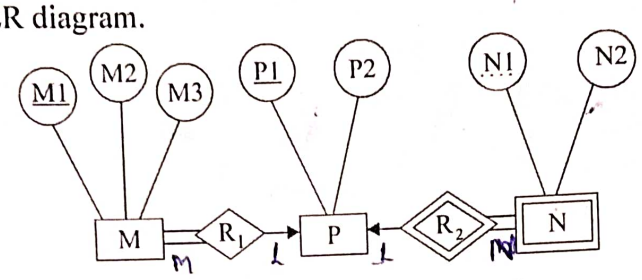
(B) An attribute of an entity can be composite

(C) In a row of a relational table, an attribute can have more than one value

(D) In a row of a relational table, an attribute can have exactly one value or a NULL value. **[GATE-2012]**

Common Data for Questions 6 to 7

Consider the following ER diagram.



[GATE-2008]

Q.6 The minimum number of tables needed to represent M, N, P, R1, R2 is

(A) 2 (B) 3 (C) 4 (D) 5

Q.7 Which of the following is a correct attribute set for one of the tables for the correct answer to the above question?

(A) {M1, M2, M3, P1} (B) {M1, P1, N1, N2}

(C) {M1, P1, N1} (D) {M1, P1}

Q.8 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.

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

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 **[GATE-2005]**

Q.9 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?

(A) 2 (B) 3 (C) 4 (D) 5 **[GATE-2005]**

9.

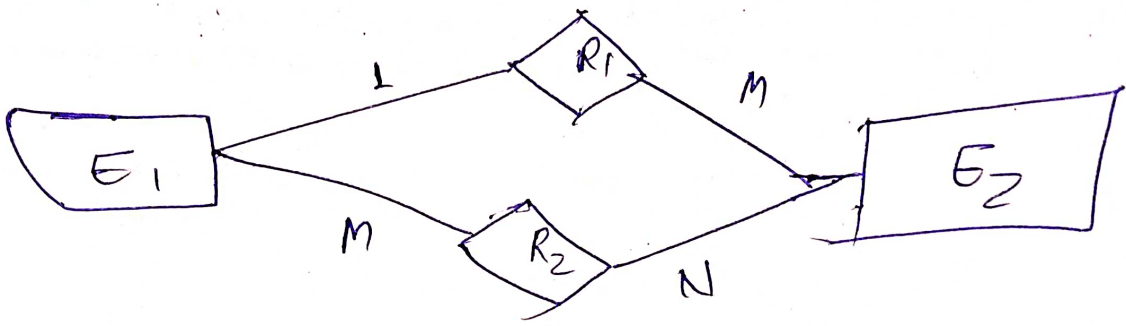


Table Required for

E_1 , E_2 & R_2

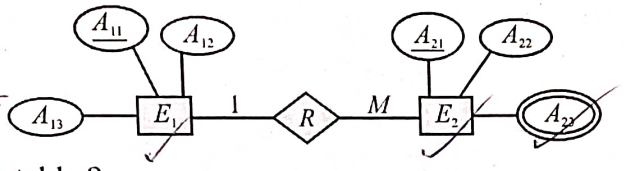
3 Tables Ans

Q.10 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

(A) Person (B) Hotel Room (C) Lodging (D) None of these **[GATE-2005]**

Q.11 Consider the following entity relationship diagram (ERD), where two entities E1 and E2 have a relation R of cardinality 1: m



The number of minimum table ?

Q.12 Let set of functional dependencies $F = \{QR \rightarrow S, R \rightarrow P, S \rightarrow Q\}$ hold on a relation schema $X = (PQRS) \cdot X$ is not in BCNF. Suppose X is decomposed into two schemas Y and Z, where $Y = (PR)$ and $Z = (QRS)$.

Consider the two statements given below.

I. Both Y and Z are in BCNF.

II. Decomposition of X into Y and Z is dependency preserving and lossless.

Which of the above statements is/are correct?

(A) Both I and II (B) I only

(C) II only (D) Neither I nor II **[GATE-2019]**

Q.13 Consider the following four relational schemas. For each schema all non-trivial functional dependencies are listed. The under lined attributes are the respective primary keys.

Schema I : Registration (roll no. ,courses)

Roll no. → courses

Schema II : Registration (roll no. ,course id, email)

Roll no, courseid → email

Email → roll no.

Schema III : Registration (roll no, courseid, marks, grade)

Roll no. course id → marks, grade

marks → grade

Schema IV : Registration (roll no, courseid, credit)

Roll no, courseid → credit

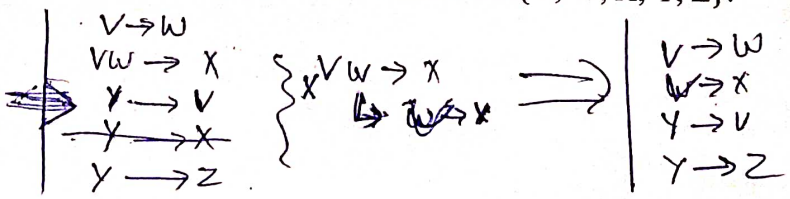
Courseid → credit

Which one of the relational schema above 3 NF but not in BCNF?

(A) I (B) II (C) III (D) IV **[GATE-2018]**

Q.14 The following functional dependencies hold true for the relational schema R{V, W, X, Y, Z}:

$V \rightarrow W$
$VW \rightarrow X$
$Y \rightarrow VX$
$Y \rightarrow Z$



Which of the following is irreducible equivalent for this set of functional dependencies?

(A) $V \rightarrow W$
$V \rightarrow X$
$Y \rightarrow V$
$Y \rightarrow Z$

(B) $V \rightarrow W$
$W \rightarrow X$
$Y \rightarrow V$
$Y \rightarrow Z$

(C) $V \rightarrow W$
$V \rightarrow X$
$Y \rightarrow V$
$Y \rightarrow X$
$Y \rightarrow Z$

(D) $V \rightarrow W$
$W \rightarrow X$
$Y \rightarrow V$
$Y \rightarrow X$
$Y \rightarrow Z$

[GATE-2017]

Q.15 A database of research articles in a journal uses the following schema.

(VOLUME, NUMBER, STARTPAGE, ENDPAGE, TITLE, YEAR, PRICE)

The primary key is (VOLUME, NUMBER, STARTPAGE, ENDPAGE) and the following functional dependencies exist in the schema.

(VOLUME, NUMBER, STARTPAGE, ENDPAGE) →TITLE

(VOLUME, NUMBER) →YEAR

(VOLUME, NUMBER, STARTPAGE, ENDPAGE) →PRICE

The database is redesigned to use the following schemas.

(VOLUME, NUMBER, STARTPAGE, ENDPAGE, TITLE, PRICE)

(VOLUME, NUMBER, YEAR)

Which is the weakest normal form that the new database satisfies, but the old one does not?

(A) 1 NF (B) 2 NF (C) 3 NF (D)BCNF **[GATE-2016]**

Q.16 Which of the following is **NOT** a super key in a relational schema with attributes V, W, X, Y, Z and primary key V Y?

(A)VXYZ (B) VWXZ (C) VWXY (D)VWXYZ **[GATE-2016]**

Q.17 Consider the relation X (P, Q, R, S, T, U) with the following set of functional dependencies

F = {
{P, R} →{S, T},
{P, S, U} →{Q, R}
}

Which of the following is the trivial functional dependency in F^+, where F^+ is closure of F?

(A) {P, R} →{S, T}
(B) {P, R} →{R, T}
(C) {P, S} →{S}
(D) {P, S, U} →{Q}

[GATE-2015]

Q.18 A prime attribute of a relation scheme R is an attribute that appears.

(A) In all candidate keys of R

(B) In some candidate key of R

(C) In a foreign key of R

(D) Only in the primary key of R

[GATE-2014]

Q.19 The maximum number of super keys for the relation schema R(E, F, G, H) with E as key is 8 Ans

[GATE-2014]

Q.20 Given an instance of the STUDENTS relation as shown below :

StudentID	StudentName	StudentEmail	StudentAge	CPI
2345	Shankar	shankar@math	X	9.4
1287	Swati	swati@ee	19	9.5
7853	Shankar	shankar@cse	19	9.4
9876	Swati	swati@mech	18	9.3
8765	Ganesh	ganesh@civil	19	8.7

X ≠ 19

For (StudentName, StudentAge) to be a key for this instance, the value X should NOT be equal to 19 Ans

[GATE-2014]

Q.21 Given the following two statements:

S1 : Every table with two single-valued attributes is in 1 NF, 2 NF, 3 NF and BCNF.

S2 : AB→C, D→E, E→C is a minimal cover for the set of functional dependencies AB→C, D→E, AB→E, E→C

Which one of the following is **CORRECT**?

(A) S1 is TRUE and S2 is FALSE

(B) Both S1 and S2 are TRUE

(C) S1 is FALSE and S2 is TRUE

(D) Both S1 and S2 are FALSE **[GATE-2014]**

Q.22 Consider the relation schema R = (E, F, G, H, I, J, K, L, M, N) and the set of functional dependencies

{{E, F} →{G}

{F} →{I, J}

{E, H} →{K, L}

{K} →{M}

{L} →{N}} on R.

$EF^+ = EFGIJ$ X

$EFH^+ = EFHGIJKLMN$ ✓

What is the key of R?

(A) {E, F}

(B) {E, F, H}

(C) {E, F, H, K, L}

(D) {E}

[GATE-2014]

Superkey of EFH

Common Data for Questions 22 to 23

Relation R has eight attributes ABCDEFGH. Fields of R contain only atomic values.

F = {CH→G, A→BC, B→CFH, E→A, F→EG} is a set of functional dependencies (FDs) so that F^+ is exactly the set of FDs that hold for R.

(AD, BD, ED, FG)

[GATE-2013]

Q.22 How many candidate keys does the relation R have?

→ 9 (C.K)

(A) 3

(B) 4

(C) 5

(D) 6

Q.23 The relation R is

(A) In 1 NF, but not in 2 NF
(B) In 2 NF, but not in 3 NF
(C) In 3 NF, but not in BCNF
(D) In BCNF

Q.24 Which of the following is **TRUE**?

(A) Every relation in 3NF is also in BCNF.
(B) A relation R is in 3NF if every non-prime attribute of R is fully functionally dependent on every key of R.
(C) Every relation in BCNF is also in 3NF.
(D) No relation can be in both BCNF and 3NF.

[GATE-2012]

Q.25 The following functional dependencies hold for relations R (A, B, C) and S (B, D, E):

$B \rightarrow A, A \rightarrow C$

The relation R contains 200 tuples and the relation S contains 100 tuples. What is the maximum number of tuples possible in the natural join $R \bowtie S$?

(A) 100 (B) 200 (C) 300 (D) 2000 **[GATE-2010]**

Q.26 Consider a relational table with a single record for each registered student with the following attributes.

1. **Registration_Num :** Unique registration number of each registered student.
2. **UID :** Unique identity number, unique at the national level for each citizen.
3. **Bank Account_Num :** Unique account number at the bank. A student can have multiple accounts or joint accounts. This attributes stores the primary account number.
4. **Name :** Name of the student.
5. **Hostel_Room :** Room number of the hostel.

Which of the following options is **INCORRECT?**

(A) BankAccount_Num is candidate key
(B) Registration_Num can be a primary key
(C) UID is a candidate key if all students are from the same country
(D) If S is a super key such that $S \cap UID$ is NULL then $S \cup UID$ is also a super key. **[GATE-2011]**

Q.27 Consider the following relational schemes for a library database:

Book (Title, Author, Catalog_no, Publisher, Year, Price)
Collection (Title, Author, Catalog_no)

With the following functional dependencies

I. Title, Author $\rightarrow$ Catalog_no
II. Catalog_no $\rightarrow$ Title, Author, Publisher, Year
III. Publisher, Title, Year $\rightarrow$ Price

Assume {Author, Title} is the key for both schemes. Which of the following statements is true?

(A) Both Book and Collection are in BCNF.
(B) Both Book and Collection are in 3 NF only.
(C) Book is in 2 NF and Collection is in 3 NF.
(D) Both Book and Collection are in 2 NF only. **[GATE-2008]**