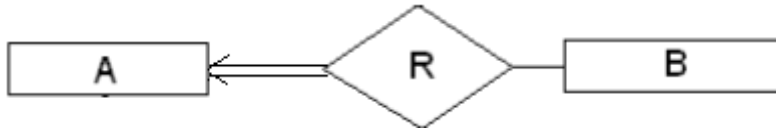


ENTITY RELATIONSHIP MODEL

Q1.

[MSQ]

Given the portion of an ER diagram shown below



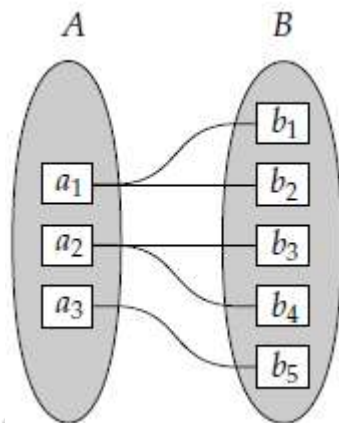
Which of the following statements is/are true?

- (a) R connects each entity in A to at least one entity in B
- (b) R connects each entity in A to at most one entity in B
- (c) R connects each entity in B to at least one entity in A
- (d) R connects each entity in B to at most one entity in A

Answer: (a) and (d)

Solution:

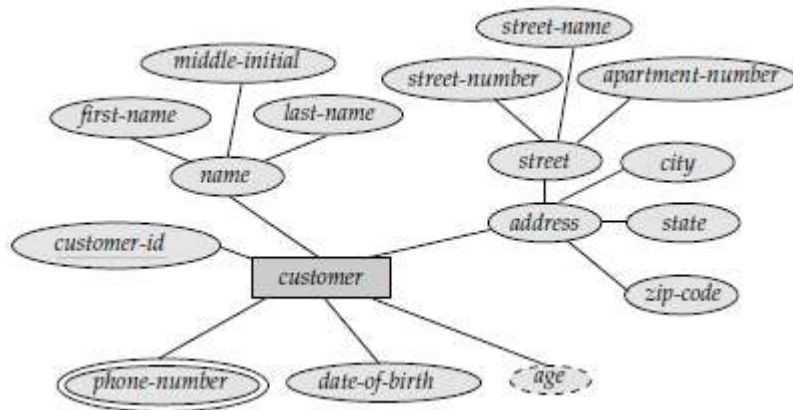
Relationship is one to many (A to B) and there is total participation of A.



- (a) True. R connects each entity in A to at least one entity in B because total participation of A is given.
- (b) False. Because of relation is one to many for A to B, therefore, each entity of A can make relationship with many entities of B and each entity of B can make relationship with only one entity of A.
- (c) False. Because there is partial participation of B.
- (d) True. Since relationship is one to many R each entity in B to at most one entity in A.

Answer A and D.

Q2. Consider the following ER Diagram Shown below:



The number of attribute of the relation customer if the above ERD is mapped into a relation model which always satisfy 3NF?_____

Answer: (11)

Solution:

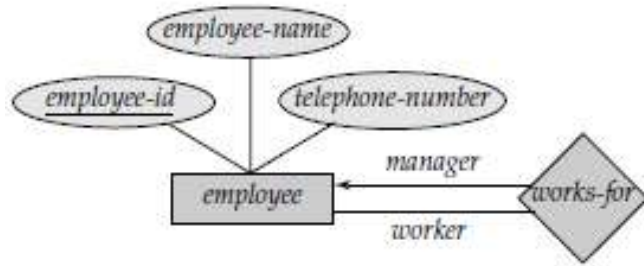
Conversion rules of strong entity set to relational table:

- For each strong entity set make separate table in the relational model.
- For each simple attributes create a field/column/attribute in the table.
- For each composite attributes, we create a separate attribute for each of the component attributes; we do not create a separate column for the composite attribute itself.
- For each multivalued attributes, we do not create a separate column. Instead of it for a multivalued attribute M, we create a table T with a column C that correspondsto M and columns corresponding to the primary key of the entity set or relationshipset of which M is an attribute.
- For each derived attribute, we do not create a separate column. The value for this type of attribute can be derived from the values of other related attributes or entities.

Attributes of customer table.

1. Customer_id (primary key)
2. First_name
3. Middle_name
4. last_name

	5. Date_of_birth 6. street_number 7. street_name 8. apartment_name 9. city 10. state 11. zip_code Answer: 11
Q3.	<p>Consider the following ER Diagram Shown below:</p> <p>Which of the following possible relations will hold if the above ERD is mapped into relation models which always satisfy 3NF?</p> <ol style="list-style-type: none"> 1. employee (<u>employee-id</u>, employee-name, telephone-number, manger-id) 2. employee (<u>employee-id</u>, employee-name, telephone-number) 3. works-for (<u>employee-id</u>, manger-id) <p>(a) 1 only (b) 2 only (c) 2 and 3 only (d) Either a or c</p> <p>Answer: (C)</p> <p>Solution:</p> <p>Since relationship is many to many so separate table of relationship will create. employee (<u>employee – id</u>, employee_ name, telephone_ number) Works_for (<u>employee – id</u>, manager – id)</p>
Q4.	<p>Consider the following ER Diagram Shown below:</p>



Which of the following possible relations will hold if the above ERD is mapped into a relation model which always satisfies 3NF?

1. employee (employee-id, employee-name, telephone-number, manger-id)
2. employee (employee-id, employee-name, telephone-number)
3. works-for (employee-id, manger-id)

- (a) 1 only
- (b) 2 only
- (c) 2 and 3 only
- (d) Either a or c

Answer: (A)

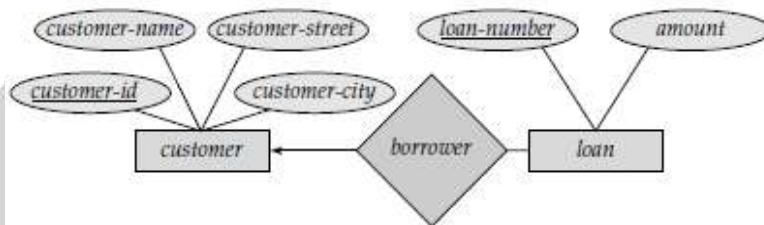
Solution:

Sine relationship is one to many, so relationship table will not create, only one table is created i.e. employee.

employee (employee – id, employee – name, telephone – number, manager – id)

Answer A

Q5. Consider the following ER Diagram Shown below:



Which of the following possible relations will hold if the above ERD is mapped into a relation model which always satisfies 3NF?

1. customer(customer-id, customer-name, customer-street, customer-city)
2. loan(loan-number, customer-id, amount)
3. customer(customer-id, lone-number, customer-name, customer-street, customer-city)

4. loan(loan-number, amount)

5. borrower(customer-id, loan-number)

(a) 1 and 2 only

(b) 1 and 4 only

(c) 1, 4 and 5 only

(d) 3 and 4 only

Answer: (a) or (c)

Solution:

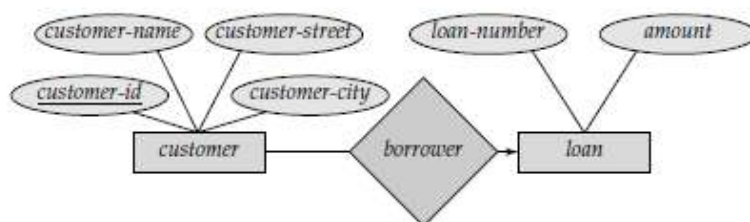
Since relationship is one to many so relationships table will not create and primary key of one is shifted towards many. So there are two table created. First one is customer and second one is loan.

- Customer (Customer – id, customer- name, customer – street customer city)
- loan (loan – number, customer – id, amount)

When it is asked for the minimum number of relations, in that case correct answer is (a).But when it is not asked then, we can create three separate tables for entity sets and relationship.In this case, tables are

- customer(customer-id, customer-name, customer-street, customer-city)
- loan(loan-number, amount)
- borrower(customer-id, loan-number)

Q6. Consider the following ER Diagram Shown below:



Which of the following is/are possible relations when the above ERD is mapped into a relation model which always satisfies 3NF?

1. customer(customer-id, customer-name, customer-street, customer-city)

2. loan(loan-number, customer-id, amount)

3. customer(customer-id, lone-number, customer-name, customer-street, customer-city)

4. loan(loan-number, amount)

5. borrower(customer-id, loan-number)

(a) 1 and 2 only

(b) 3 and 4 only

(c) 1, 4 and 5 only

(d) 1 and 4 only

Answer: (b) or (c)

Solution:

Since relationship is many to one so relationship table will not create and primary key of one is shift towards name. So there are two tables 1stCustomer and 2nd loan.

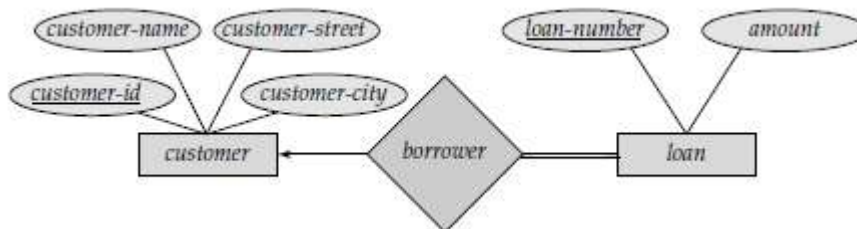
Customer (customer-id, loan-number, customer-name, customer-street, customer-city)

loan (loan-number, amount)

So, When it is asked for the minimum number of relations, in that case correct answer is (b). But when it is not asked then, we can create three separate tables for entity sets and relationship. In this case, tables are

- customer(customer-id, customer-name, customer-street, customer-city)
- loan(loan-number, amount)
- borrower(customer-id, loan-number)

Q7. Consider the following ER Diagram Shown below:



Which of the following is/are possible relations when the above ERD is mapped into a relation model which always satisfies 3NF?

1. customer(customer-id, customer-name, customer-street, customer-city)
2. loan(customer-id, loan-number, amount)
3. customer(customer-id, loan-number, customer-name, customer-street, customer-city)
4. loan(loan-number, amount)
5. borrower(customer-id, loan-number)

(a) 1 and 2 only

(b) 3 and 4 only

(c) 1, 4 and 5 only

(d) either a or b

Answer: (a) or (c)

Solution:

Since relationship is one to many & there is total participation of many so relationship

tables will not create.

Customer (customer – id, customer – name, customer – street, customer – city)

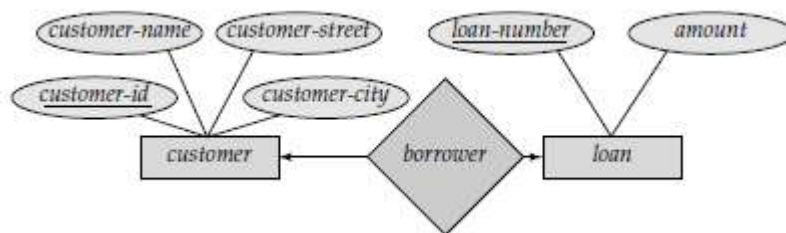
loan (customer – id, loan – number, amount)

When it is asked for the minimum number of relations, in that case correct answer is (a).

But when it is not asked then, we can create three separate tables for entity sets and relationship. In this case, tables are

- customer(customer-id, customer-name, customer-street, customer-city)
- loan(loan-number, amount)
- borrower(customer-id, loan-number)

Q8. Consider the following ER Diagram Shown below:



Which of the following is/are possible relations when the above ERD is mapped into a relation model which always satisfies 3NF?

1. customer(customer-id, customer-name, customer-street, customer-city)
2. loan(loan-number, customer-id, amount)
3. customer(customer-id, loan-number, customer-name, customer-street, customer-city)
4. loan (loan-number, amount)
5. customer-loan(customer-id, customer-name, customer-street, customer-city, loan-number, amount)

(a) 1 and 2 only (b) 3 and 4 only (c) 5 only (d) either a or b

Answer: (d)

Solution:

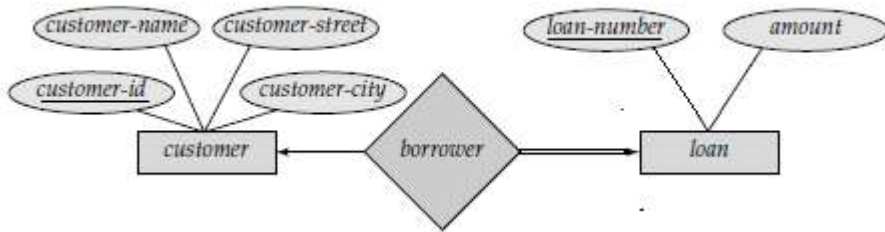
Since relationship is one to one & there is partial participation of both entities therefore there are two possibilities.

1st possibility:-

Customer (customer – id, customer – name, customer – street customer – city)

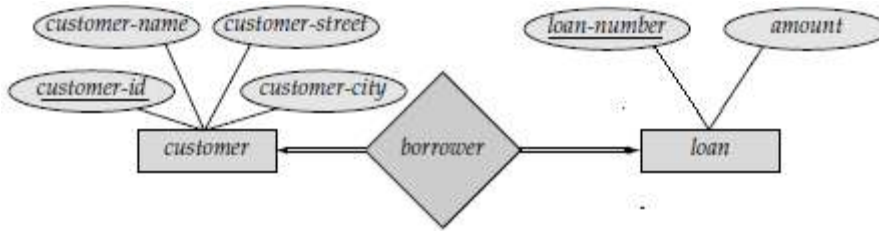
loan (loan – number, customer – id, amount)

2nd possibility:-

	<p>Customer (<u>customer-id</u>, loan-number, customer-name customer-street, customer-city)</p> <p>loan (loan – number, amount)</p> <p>Answer: D</p>
Q9.	<p>Consider the following ER Diagram Shown below:</p>  <p>Which of the following is/are possible relations when the above ERD is mapped into a relation model which always satisfies 3NF?</p> <ol style="list-style-type: none"> 1. customer(<u>customer-id</u>, customer-name, customer-street, customer-city) 2. loan(<u>loan-number</u>, customer-id, amount) 3. customer(<u>customer-id</u>, loan-number, customer-name, customer-street, customer-city) 4. loan (<u>loan-number</u>, amount) 5. customer-loan(<u>customer-id</u>, customer-name, customer-street, customer-city, loan-number, amount) <p>(a) 1 and 2 only (b) 3 and 4 only (c) 5 only (d) either a or b</p> <p>Answer: (b)</p> <p>Solution:</p> <p>Relationship is one to one then there can be three cases:</p> <ol style="list-style-type: none"> 1. Total participation of both tables. In this case only one table is created. I.e. combined table of both entities and primary key can be the primary key of any one table. 2. Partial participation of both tables. In this case two tables will create and relationship table will not create. Also primary key can be shifted any side of table. 3. Total participation of one table & partial participation of another table. In this case two tables will create and relationship table will not create. Also primary key of table having partial participation shift toward the table having the total participation. <p>So, in this question, relationship is one to one & total participation of loan entity only so it is third case.</p> <p>Customer (<u>Customer – id</u>, customer – name, customer – street, customer – city)</p>

loan (loan – number, customer – id , amount)

Q10. Consider the following ER Diagram Shown below:



Which of the following is/are possible relations when the above ERD is mapped into a relation model which always satisfies 3NF?

1. customer(customer-id, customer-name, customer-street, customer-city)
 2. loan(loan-number, customer-id, amount)
 3. customer(customer-id, loan-number, customer-name, customer-street, customer-city)
 4. loan (loan-number, amount)
 5. customer-loan(customer-id, customer-name, customer-street, customer-city, loan-number, amount)
- (a) 1 and 2 only (b) 3 and 4 only
- (c) 5 only (d) either a or b

Answer: (c)

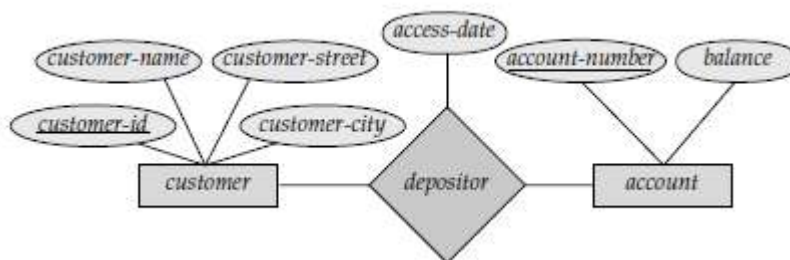
Solution:

Relationship is one to one & total participation of both the tables so only one table will create i.e. combined table.

Customer –loan (customer – id, customer – name, customer – street, customer – city loan – number, amount)

Answer: C

Q11. Consider the following ER Diagram Shown below:



Which of the following is/are possible relations when the above ERD is mapped into a relation model which always satisfies 3NF?

Answer: (a)

Solution:

In this payment is weak entity. Weak entity is an entity who does not have its own primary key. Weak entity is represented by double rectangle and relationship is represented by double diamond. In case of weak entity, relationship table will not create.

Here two tables will create

1) Loan

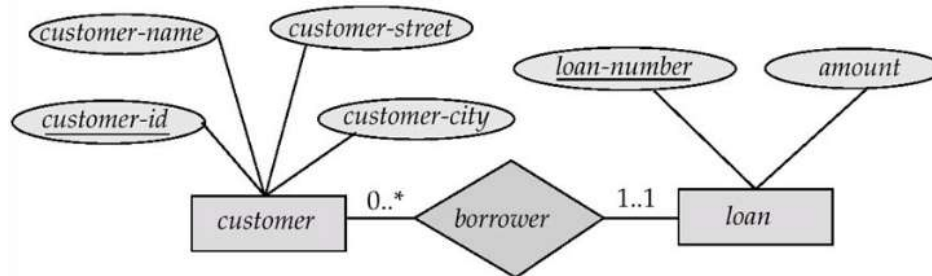
2) Payment

Loan (loan – number, amount)

Payment (payment- number, loan -number, payment – date, payment – amount)

Answer: A

For the next three questions, consider the following ER Diagram shown below:



Q13. Which of the following entity set in the relationship set represent total participation?

(a) customer

(b) borrower

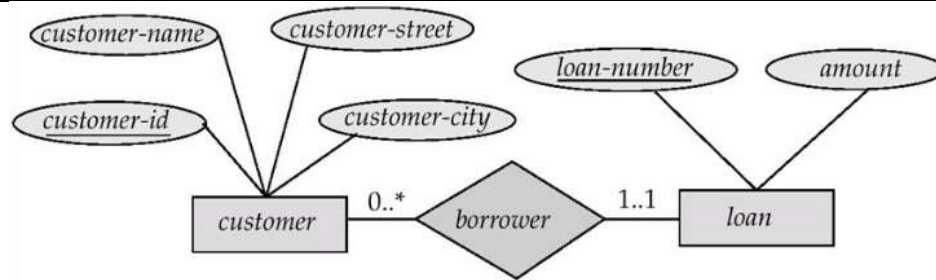
(c) loan

(d) None

Answer: (c)

Solution:

An edge between an entity set and a binary relationship set can have an associated minimum and maximum cardinality, shown in the form $l..h$, where l is the minimum and h the maximum cardinality. A minimum value of 1 indicates total participation of the entity set in the relationship set. A maximum value of 1 indicates that the entity participates at most one relationship, while a maximum value $*$ indicates no limit. Note that a label $1..*$ on an edge is equivalent to a double line.



Loan entity set in the relationship set represent total participation.

- Q14.** Which type of mapping exists between customer-loan relationships?
 (a) one-to-many (b) many-to one (c) many-to-many (d) one-to one

Answer: (a)

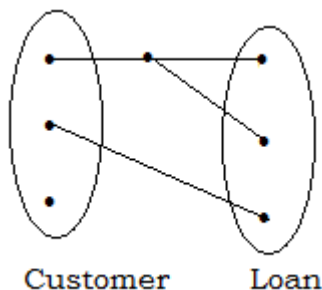
Solution:

One to many relationship exists between customer and loan.

- Q15. [MSQ]**
 Which of the following statements is/are TRUE about above ER?
1. Each customer can take more than one loan.
 2. Each loan can have more than one customer.
 3. Each customer can take only one loan.
 4. Each loan must have exactly one customer.
 5. Each customer must have at least one loan.

Answer: (1) and (4)

Solution:



- Each customer can take more than one loan.
- Each loan must have exactly one customer because of total participation.

Answer (1) & (4)

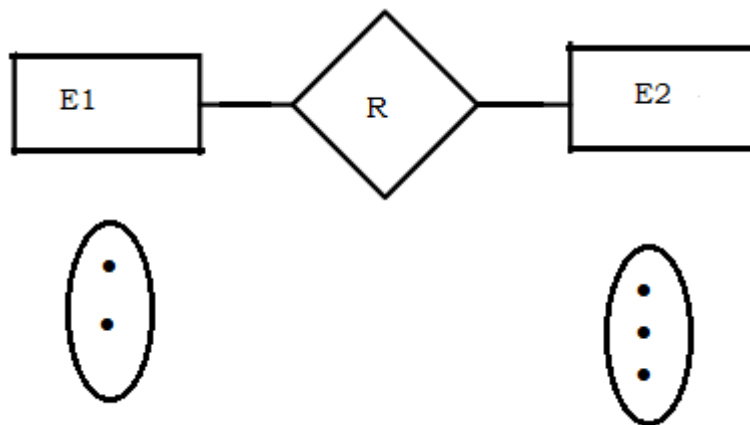
- Q16.** Suppose a relationship R has a mapping cardinality of type many-to-many between the

entities E1 and E2. Let the entity set E1 has 2 entities and E2 with 3 entities. Also that both E1 and E2 has partial participation in relationship. What are the minimum and the maximum number of instances of the relationship type R?

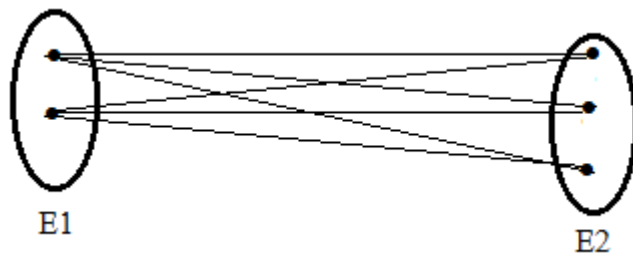
- (a) A min of 2 and a max of 3
- (b) A min of 0 and a max of 6
- (c) A min of 0 and a max of 3
- (d) A min of 2 and a max of 6

Answer: (b)

Solution:



Since partial participation therefore minimum number instances of the relationship type R is 0, and maximum of $2 * 3 = 6$



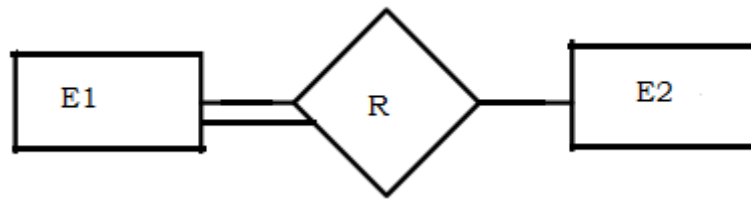
Q17. Suppose a relationship R has a mapping cardinality of type many to many between the entities E1 and E2. Let the entity set E1 has 2 entities and E2 with 3 entities. Also that E1 has total participation and E2 has partial participation in relationship. What is the minimum and the maximum number of instances of the relationship type R?

- (a) A min of 2 and a max of 3
- (b) A min of 0 and a max of 6
- (c) A min of 0 and a max of 3

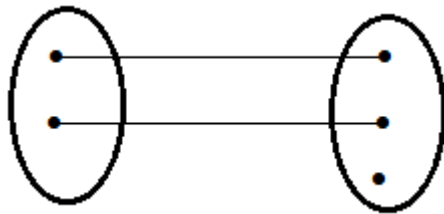
(d) A min of 2 and a max of 6

Answer: (d)

Solution:

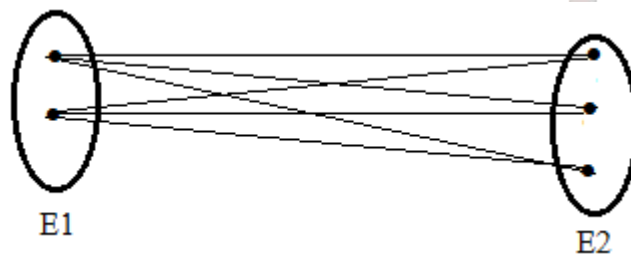


Minimum



minimum of 2

Maximum



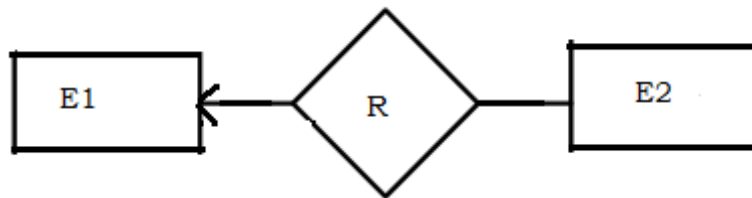
Maximum of $2 * 3 = 6$

Q18. Suppose a relationship R has a mapping cardinality of type one to many between the entities E1 and E2. Let the entity set E1 has 2 entities and E2 with 3 entities. Also that both E1 and E2 has partial participation in relationship. What are the minimum and the maximum number of instances of the relationship type R?

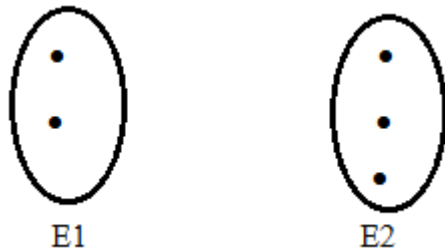
- (a) A min of 2 and a max of 3
- (b) A min of 0 and a max of 6
- (c) A min of 0 and a max of 3
- (d) A min of 2 and a max of 6

Answer: (c)

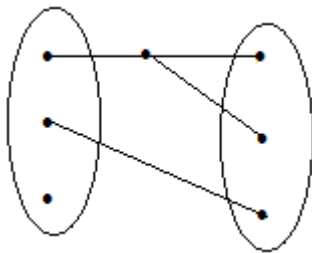
Solution:



Minimum



Since partial participation so minimum is zero.



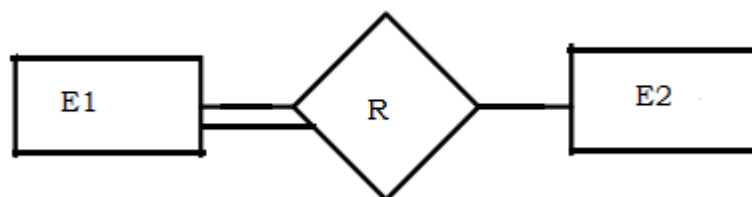
Maximum is 3 because relationship is one to many

Q19. Suppose a relationship R has a mapping cardinality of type one to many between the entities E1 and E2. Let the entity set E1 has 2 entities and E2 with 3 entities. Also that E1 has total participation and E2 has partial participation in relationship. What are the minimum and the maximum number of instances of the relationship type R?

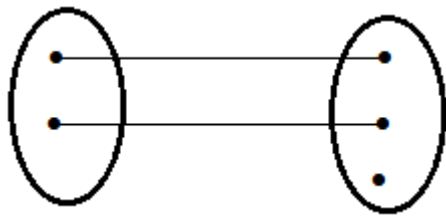
- (a) A min of 2 and a max of 3
- (b) A min of 0 and a max of 6
- (c) A min of 0 and a max of 3
- (d) A min of 2 and a max of 6

Answer: (a)

Solution:



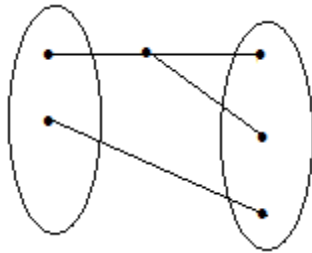
Minimum



E1

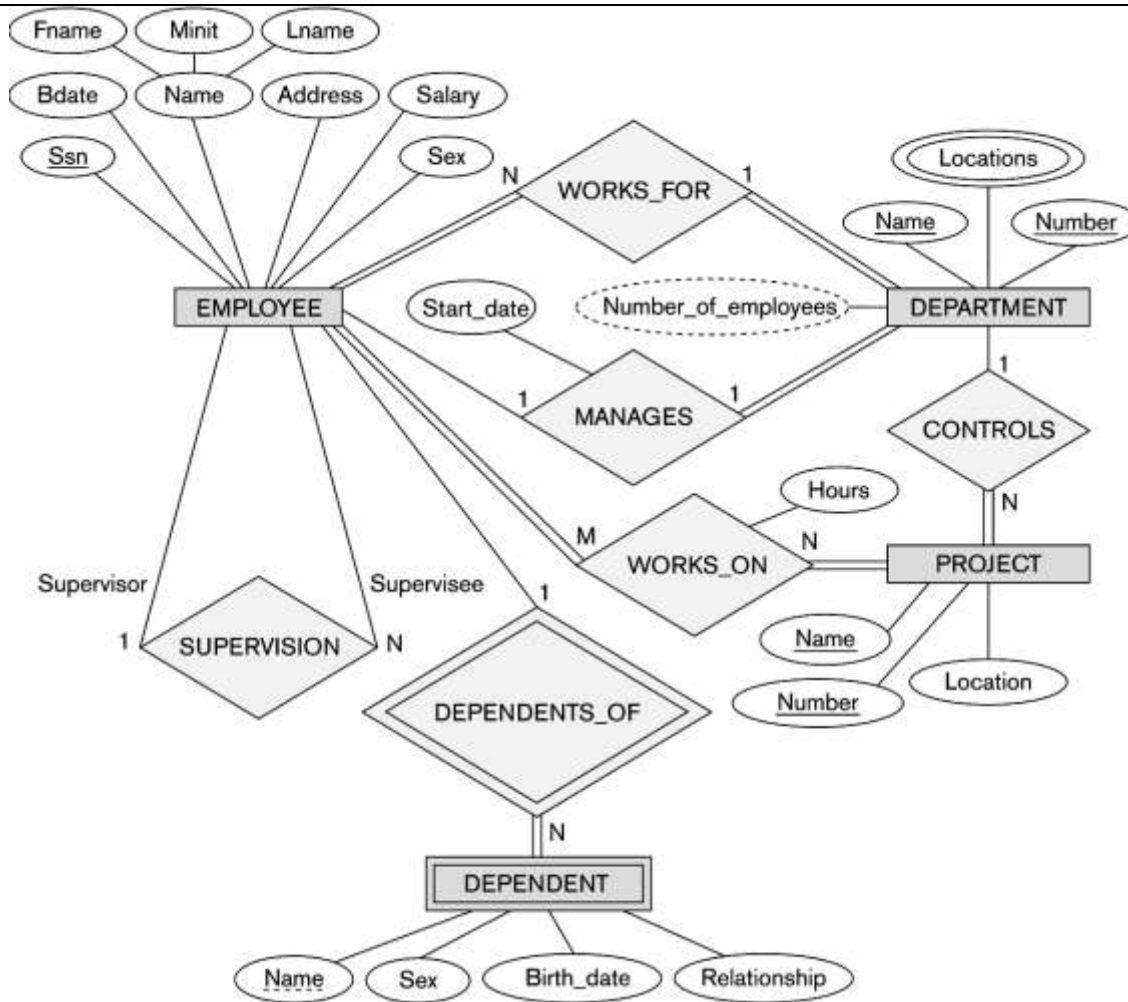
E2

Since relationship is one to many (E1 to E2) & there is total participation of E1 therefore minimum 2.



Maximum 3

Q20. Consider the following ER-model:



The minimum number of relations that would be generated if all the relations are in 3NF is _____.

Answer: (6)

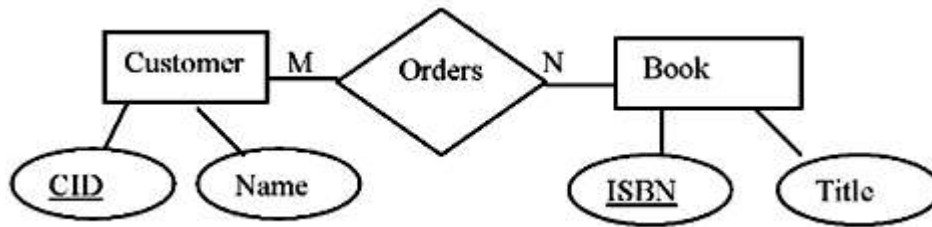
Solution:

- 1) Employee
- 2) Department
- 3) Projects
- 4) works – on
- 5) dependent
- 6) locations

So minimum 6 relations generated

Answer 6

Q21. Which statement is NOT consistent with the following ER diagram?



Consider that an instance of the "Orders" relationship is called an Order.

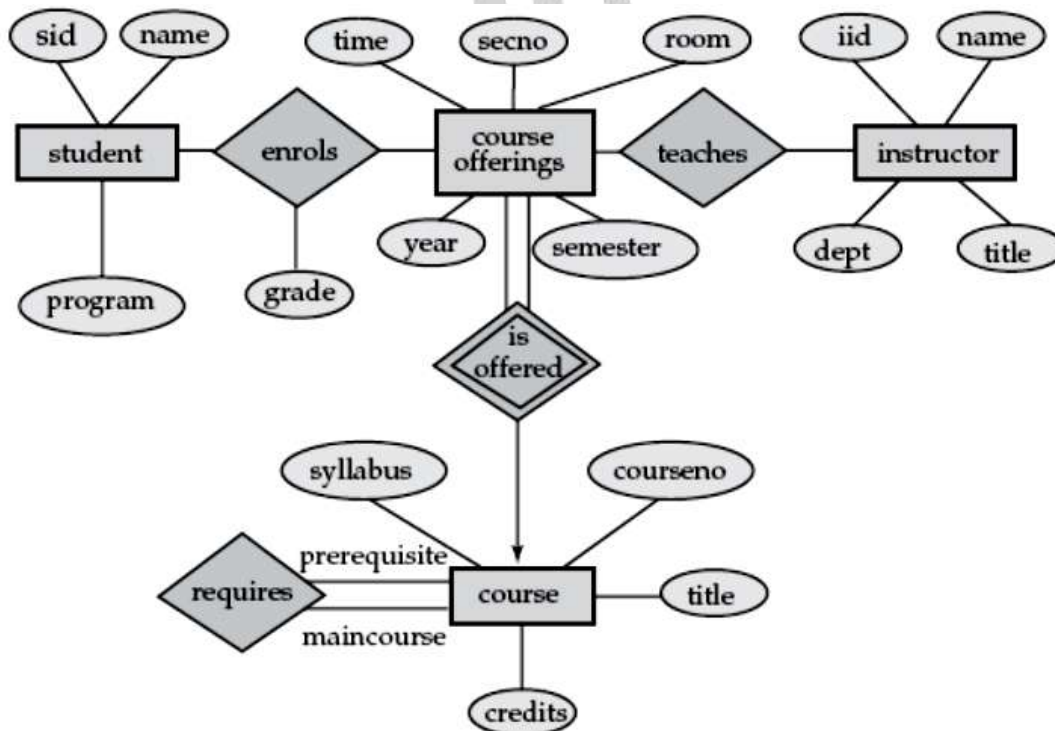
- (a) A customer may place two orders for different books.
- (b) There are books that have not been ordered by any customer.
- (c) A customer may place two orders for the same book.
- (d) There is a book that has 1000 orders from customers.

Answer: (c)

Solution:

- 1) It is true because relationship is many to many
- 2) True, because participation of book is partial participation.
- 3) False, since cid and ISBN is the primary key for relation order therefore it can not duplicate,
- 4) True, because relationship is many to many.

Q22. Consider the following ER-model:



The minimum number of relations that would be generated if all the relations are in 3NF is _____.

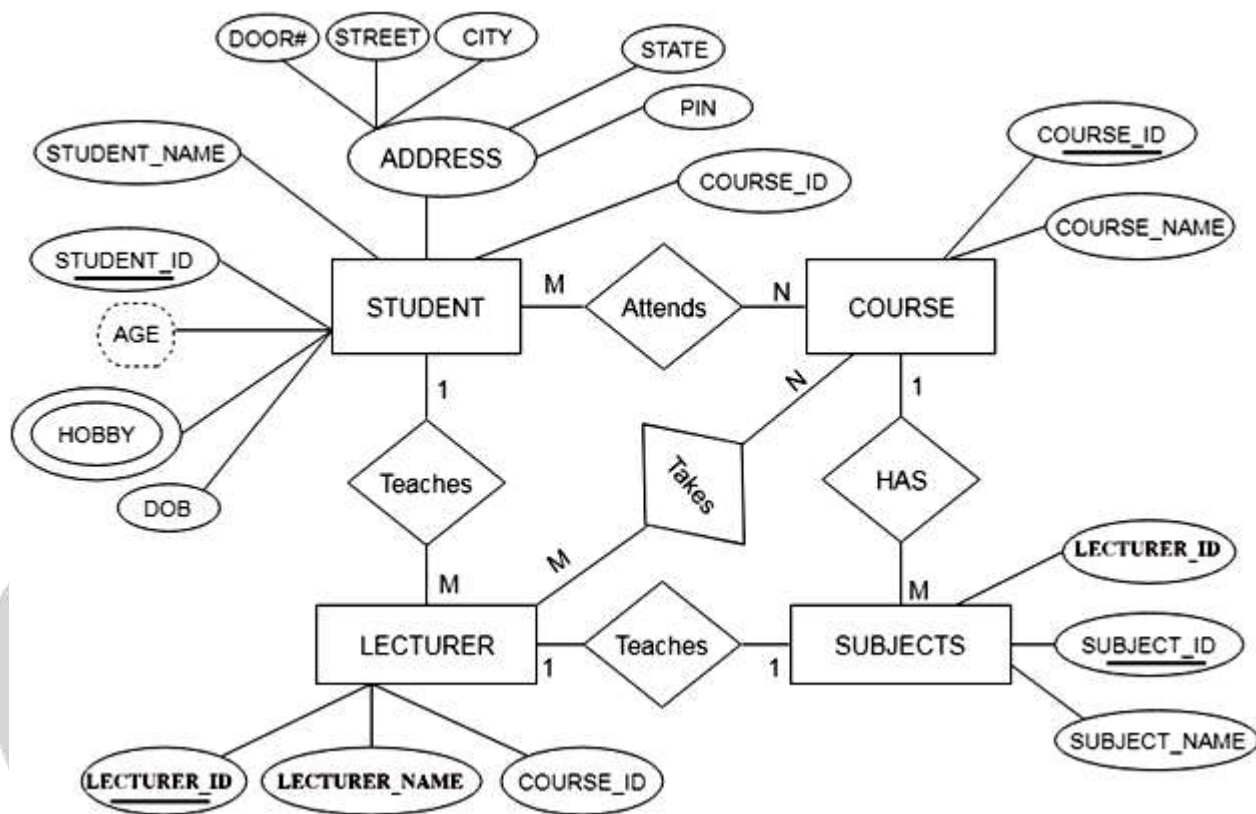
Answer: (7)

Solution:

- 1) Student
- 2) enrolls
- 3) course offerings
- 4) teachers
- 5) instructor
- 6) course
- 7) requires

Answer: 7

Q23. Consider the following ER-model:



The minimum number of relations that would be generated if all the relations are in 3NF is _____.

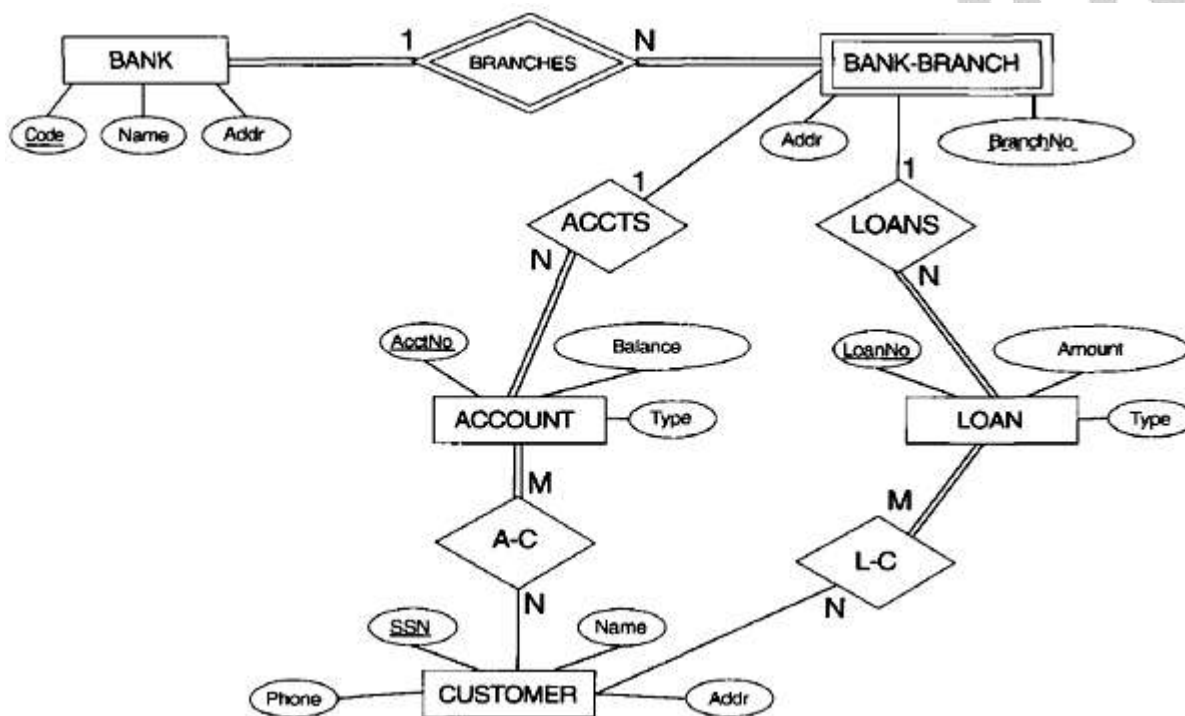
Answer: (7)

Solution:

- 1) Student
- 2) Attends
- 3) Course
- 4) takes
- 5) Subjects
- 6) Lecturer
- 7) Hobby

Answer: 7

Q24. Consider the following ER-model:



The minimum number of relations that would be generated if all the relations are in 3NF is

Answer: (7)

Solution:

- 1) Bank
- 2) Bank – branch
- 3) Loan
- 4) L – C
- 5) Accounts

6) A – C 7) Customer Answer: 7
