❖ Relations:-

  ➢ R is a relation on those n sets.
  ➢ If it is a set of recorded n- tuples (d1, d2,......,dn) such that d1,d2 belongs to d2 ....dn belongs to dn.
  ➢ Set d1,d2,.... Dn are the domains of R.
  ➢ The value n is degree of R.

Emp_code	Name	Designation
101	Paresh	Programmer
102	Mahesh	DBA
103	Ramesh	Manager
104	Sunil	Software
105	Prakash	I T Programmar
106	Piyush	System Analyst

  ➢ In this figure shows a relation called employee.
  ➢ It has three domains named Emp_code, Name, Designation.
  ➢ It has three degree.
  ➢ The Relational data model represents entities with attributes.

❖ Entities:-

  ➢ An entity is simply a person, place, event, or thing for which we wish to collect data.
  ➢ Example, in a university environment, entities of interest might students, faculty member, coerces.
  ➢ Another example if you work for an airline, appropriate entities might be pilots, aircraft, routes, suppliers and any number of additional items for which data must be gathered.

❖ Attributes:-

  ➢ Each entity has certain characteristics known as attributes.
  ➢ For example the student entity have attributes likes student number, name, city, marks, date of birth, home, address, phone number and so on.
  ➢ It is also called columns of table.

❖ Tuple:-

- ➢ Row of a relation or table is referred as tuple.
- ➢ A tuple having a set of n-number of attribute is termed as n-tuple.

❖ Domain:-

- ➢ The values for an attribute or a column are received from a set of values known as domain.
- ➢ The domain of an attribute contains the set of values that the attributes may assume.
- ➢ In above EMPLOYEE relation domain for designation is (Programmer, Manager, DBA, System Analyst).
- ➢ In the relation model note that no two entities are a identical and the ordering of a rows is not significant. For example the domain for {1, 2, 3, 4, 5, and 6} or domain for coin {head, tail}.

❖ Degree:-

- ➢ Degree indicates the number attributes in a relation.
- ➢ Employee relations have three column and thus relation have three.

❖ Cardinality:-

- ➢ Cardinality expresses the specific number of entity or row occurrences.
- ➢ Cardinality for relation employee is 6.

❖ Keys:-

- ➢ Tables within the database share common attribute that enable us to link the tables together. Such as attributes is called as a key.
- ➢ Keys are central to the use of relational tables.
- ➢ Keys define functional dependencies ex. Other attribute are dependent on the key and can therefore be found if the key value is known.

- **Candidate key:-** one or more attributes in a relation that uniquely indentify. Each value of an entity.
- **Primary Key:-**

  A candidate key (1) having unique values in any given row.

  (2) cannot contain null values.

- **Foreign key:-**

  An attribute (or combination of attributes) in one table whose values must either match the primary key in another table or be null.

  OR

  It is a part of primary key in a table or relation and also primary key in another relation. It represents relationship between tables.

- **Alternate key or secondary key:-**
  - ➢ A candidate key that is not the primary key is called an alternate key.

❖ Discuss about Traditional set of operator in details.

- There are four types of relational operator.
    1) Union (U)
    2) Difference (-)
    3) Intersection (∩)
    4) Divide (*)

1) **Union:-**

  - ➢ In Union operation we can union or gather one or more relation and get results which have unique record.
  - ➢ For ex.

A	B
No	Name
1	ABC
2	PQR
3	XYZ

A	B
No	Name
1	PQR
2	XYZ
3	MNO

A U B	
No	Name
1	ABC
2	PQR
3	XYZ
4	MNO

➢ In above example there are two relations A&B with performing union operation on this relation have unique record.

2) Difference:-

➢ In Difference operation we can remove common data from a given table and get final result.

➢ For ex.

A	B
No	Name
1	ABC
2	PQR
3	XYZ

A	B
No	Name
1	PQR
2	XYZ
3	MNO

A - B	
No	Name
1	ABC
2	MNO

➢ In above example there are two relation A & B perform difference operation which remove common data of both relation get final result.

3) intersection :-

> In this operation give only a common data from relation.

A	B
No	Name
1	ABC
2	PQR
3	XYZ

A	B
No	Name
1	PQR
2	XYZ
3	MNO

A ∩ B	
No	Name
1	PQR
2	XYZ

> In above example A & B are two relation and we can perform intersection operation and get final result.

4) Cartesian :-

> Cartesian produces a list of all possible pairs of rows form two tables. Therefore if, one table has 4 rows and the other table has 2 rows. The product list of 4*2=8 rows.
> For ex.

A	B
No	Name
1	Anant
2	Hetul
3	Chirag
4	Roshan

A	B
No	Name
1	J1
2	J2

❖ Discuss about special Relational operator in details.

- There are four types of relational operator.
  5) Selection
  6) Projection
  7) Join
  8) Divide

5) Selection:-

- ➢ Selection or Select sql command fields values for all attributes found in a table.
- ➢ Select can be used to list all or select rows values for each attribute words.
- ➢ Select fields a **horizontal subset** of a table.
- ➢ For ex.   Person where id < 105

Person   Result of Selection

Id	Name
101	Anant
103	Hetul
104	Chirag
108	Roshan

Id	Name
101	Anant
103	Hetul
104	Chirag

6) Projection:-

- ➢ Projection or Project produces a list of all values for selected attributes.
- ➢ In other words, project, fields a **vertical subset** of a table.
- ➢ This is due to the delectation of duplicate tuples in the project relation.
- ➢ For ex.   Person where name

Person   Result of Selection

Id	Name
101	Anant
102	Anant
103	Hetul
104	Hetul
105	Chirag
106	Chirag

Id	Name
101	Anant
103	Hetul
104	Chirag

7) Join:-

- Join allows us to combine information from two or more tables.
- For example,

Employee (E)   Salary (S)   E Join S

Id	Name
101	Anant
103	Hetul
104	Hetul
107	chirag

Id	Salary
101	5000
103	7000
104	8000
107	9000

Id	Name	Salary
101	Anant	5000
103	Hetul	7000
104	Hetul	8000
107	chirag	9000

8) Divide:-

- Divide requires the use of one single column table and two column tables.

S#	P#
S1	P1
S1	P1
S1	P1

S1	P1
S1	P1
S1	P1
S1	P1

P#
P1
P#
P2
P4
P#
P1
P2
P3
P3

S#
S1
S2
S#
S1
S2
S#
S1
S2
S3