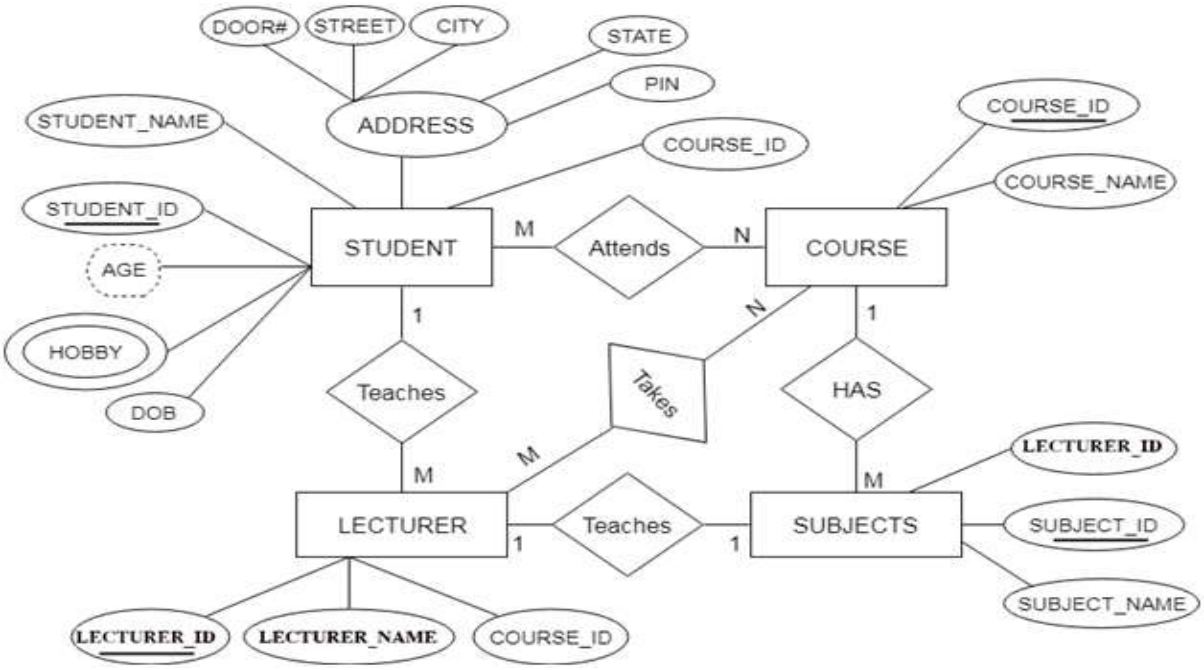
TASK – 1

Convert ER Diagram into Relational Model

AIM: To convert the given Entity-Relationship (ER) diagram into a relational model following standard database design mapping rules**.**

DIAGRAM:



Steps for converting the ER diagram to the table

1. Entity type becomes a table

each entity type in the ER diagram becomes a table in the relational model.

From the ER diagram, the main entity types are:

- STUDENT
- LECTURER
- COURSE
- SUBJECTS

Each of these will be represented as a separate table in your relational database design.

For example:

- The STUDENT entity becomes the STUDENT table.
- The LECTURER entity becomes the LECTURER table.
- The COURSE entity becomes the COURSE table.
- The SUBJECTS entity becomes the SUBJECT table.

Each table will then contain columns that represent that entity's attributes (fields such as STUDENT_ID, STUDENT_NAME for the STUDENT table, and so on).

STUDENT

Column Name	Description
STUDENT_ID	Primary Key
STUDENT_NAME	Student name
DOB	Date of birth
DOOR#	Address component
STREET	Address component
CITY	Address component
STATE	Address component
PIN	Address component
COURSE_ID	Foreign Key referencing COURSE

2. All single-valued attribute becomes a column for the table.

Rule:
All single-valued attributes in the ER diagram become columns for the corresponding table in the relational model**.**

Application to Provided ER Diagram:

For each entity type, identify the single-valued attributes (those represented by ovals and directly connected to the entity, not multivalued or composite):

- **STUDENT:**
  - STUDENT_ID
  - STUDENT_NAME
  - DOB
  - COURSE_ID
- **LECTURER:**
  - LECTURER_ID

- LECTURER_NAME
- COURSE_ID

- **COURSE:**
  - COURSE_ID
  - COURSE_NAME
- **SUBJECTS:**
  - SUBJECT_ID
  - SUBJECT_NAME
  - LECTURER_ID
- **ADDRESS (Composite, but components are single-valued):**
  - DOOR#
  - STREET
  - CITY
  - STATE
  - PIN
  - **COURSE**

• **Column Name**	• **Description**
• COURSE_ID	• Primary Key
• COURSE_NAME	• Name of the course

. LECTURER

Column Name	**Description**
LECTURER_ID	Primary Key
LECTURER_NAME	Lecturer's name
COURSE_ID	Foreign Key referencing COURSE

3. A key attribute of the entity type represented by the primary key.

Rule:

A key attribute of each entity type in the ER diagram is represented as the primary key in the corresponding table in the relational model.

Application to Provided ER Diagram:

For every entity:

- Identify the attribute that uniquely distinguishes each instance of that entity (usually underlined in the ER diagram).
- This attribute becomes the primary key for the table created for that entity.

Primary Keys for the Entities:

- **STUDENT:**
  - STUDENT_ID *(Primary Key)*
- **LECTURER:**
  - LECTURER_ID *(Primary Key)*
- **COURSE:**
  - COURSE_ID *(Primary Key)*
- **SUBJECTS:**
  - SUBJECT_ID *(Primary Key)*

SUBJECT

Column Name	Description
SUBJECT_ID	**Primary Key**
SUBJECT_NAME	**Subject name**
LECTURER_ID	**Foreign Key referencing LECTURER**

4. The multivalued attribute is represented by a separate table

Rule:

A multivalued attribute is represented by a separate table in the relational model.

Application to Provided ER Diagram:

In your ER diagram, the entity STUDENT has a multivalued attribute: HOBBY.

Implementation:

- You create a new table (e.g., STUD_HOBBY) to represent the combination of the student and their hobbies.
- Each row in this new table links a student's primary key to one of their hobbies.

Table Structure Example:

STUDENT_ID (FK)	HOBBY
1001	Drawing
1001	Singing
1002	Sports

- **STUDENT_ID:** Foreign Key referencing the STUDENT table**.**
- **HOBBY:** One hobby per row**.**

5. **Composite attribute represented by components**

Rule:

A composite attribute is represented by its component attributes as individual columns in the table**.**

Application to Provided ER Diagram:

In your ER diagram, the ADDRESS attribute for the entity STUDENT is a composite attribute. It consists of the following simple attributes:

- DOOR#
- STREET
- CITY
- STATE
- PIN

Implementation:

- Instead of creating a single column for ADDRESS, you create separate columns for each of its components in the STUDENT table.

Resulting Columns in the STUDENT Table:

- DOOR#
- STREET
- CITY
- STATE
- PIN

6. **Derived attributes are not considered in the table**

Rule:

Derived attributes are not considered in the table when converting an ER diagram to a relational model.

Application to Provided ER Diagram:

In your ER diagram, the attribute AGE for the entity STUDENT is shown as a derived attribute (usually denoted by a dashed oval). Derived attributes can be calculated from other data stored in the database (e.g., AGE can be derived from DOB).

Implementation:

- Do not create a column for derived attributes (like AGE) in the STUDENT table.

- Instead, derive such values using queries or calculations when needed, based on stored attributes like DOB.

RESULT:

Mapping/Relationships:

- STUDENT.COURSE_ID → COURSE.COURSE_ID (many students enroll in a course)
- LECTURER.COURSE_ID → COURSE.COURSE_ID (lecturers teach courses)
- SUBJECT.LECTURER_ID → LECTURER.LECTURER_ID (lecturers teach subject)
- STUD_HOBBY.STUDENT_ID → STUDENT.STUDENT_ID (students have multiple hobbies)