**1**.

a)

The main stages of database design:

1. **Conceptual design** is the construction of a semantic model of the subject area, that is , an information model of the highest level of abstraction.
2. **Logical design** - creating a database schema based on a specific data model, for example, a relational data model .
3. **Physical design** - creating a database schema for a specific DBMS. The specifics of a particular DBMS may include restrictions on the naming of database objects, restrictions on the supported data types, etc.

b)

**Entity Relationship Model**

An Entity–relationship model (ER model) describes the structure of a database with the help of a diagram, which is known as Entity Relationship Diagram (ER Diagram). An ER model is a design or blueprint of a database that can later be implemented as a database. The main components of E-R model are: entity set and relationship set.

**2**.

a)

Student

Student\_id

Name

First\_name

Last\_name

Date\_of\_birth

{Email\_address}

Age()

b)

ID

Name

First\_name

Last\_name

Universities

Discipline

Teacher

Name

Students

Departments

University

Title

Instructors

Credits

Course

Office of the Registrar

M

ID

University

Address

University

Address

Capacity

C

Dormitory

**3**.

One-to-one

Instructor

Id

Title

Credits

Course

Teacher\_id

Name

First\_name

Last\_name

Courses

Teacher

One-to-many

Instructor

Course

Id

Title

Credits

Teacher

Teacher\_id

Name

First\_name

Last\_name

Courses

Many-to-one

Instructor

Course

Id

Title

Credits

Teacher

Teacher\_id

Name

First\_name

Last\_name

Courses

Many-to-many

Instructor

Course

Id

Title

Credits

Teacher

Teacher\_id

Name

First\_name

Last\_name

Courses

**4**.

Student

Student\_id

Name

First\_name

Last\_name

Date\_of\_birth

{Email\_address}

Age()

Owns

Dormitory

University

Address

Capacity

C

University

Name

Students

Departments

Studies



Learns

Works

ID

University

Address

Office of the Registrar

M

Course

Title

Instructors

Credits



Teacher

ID

Name

First\_name

Last\_name

Universities

Discipline

I



Teaches



**5.**

Located

Work\_place

Employee

Employee\_id

Name

First\_name

Last\_name

Salary

{Email\_address}

Age()

Department

Id

Name



Ordered

Tasks for dept



Lives

Clients

Id

Name

First\_name

Last\_name

Projects

Owns

Tasks

Order\_id

Department

Order

Works

Projects

Project\_id

Project\_name

Branch

Dept\_name

Location