**Problem 1. Building an ER model for a hospital**

1. Finding Entities, key Attributes and related Attributes

* Doctor

+ Key attributes: doctor code

+ Related attributes: doctor's name, date of employment, and specialty.

* Patient

+ Key attributes: patient identification

+ Related attributes: patient name

* Treatment

+ Related attributes: date of treatment, duration of treatment and results

* Hospital

1. Finding Relationships

* Admit:

+ Doctor - Patient

+ One to many

* Treated by:

+ Patient - Doctor

+ Many to many: A patient can be treated by multiple doctors; a doctor can treat multiple patients.

* Save:

+ Hospital – Treatment

+ One to many

1. Finding weak Entities and weak Relationships

* Treatment is a weak entity because it relies on both the doctor and patient for unique identification.
* Save is a week relationship

1. Draw an ER model

A diagram of a patient

Description automatically generated

**Problem 2. Building an ER model for a university**

1. Finding Entities, key Attributes and related Attributes

* Faculty

+ Key attributes: Faculty code

+ Related attributes: Faculty Name

* Class

+ Key attributes: Class code

+ Related attributes: Class Name, Wholesale number

* Student

+ Key attributes: StudentID,

+ Related attributes: Full name, Date of birth, Gender, Address, Graduation point

* Subject

+ Key attributes: Subject Code

+ Related attributes: Subject Name, Number of Credits, Exam scores

* Library card

+ Key attributes: Card Number

+ Related attributes: Issue date, Expiration date

1. Finding Relationships

* Has:

+ Faculty - Class

+ One to many

* Has:

+ Class - Student

+ One to many

* Study

+ Student – Subject

+ Many to many

* Has

+ Student – Library Card

+ One to one

1. Finding weak Entities and weak Relationships

* Library card is a weak entity.
* Class is a weak entity
* All has relationships are weak relationships

1. Draw an ER model

A diagram of a company

Description automatically generated

**Problem 3. Building an ER model and relational data model for 1 hotel needs to store information as follows**

1. Finding Entities, key Attributes and related Attributes

* Room

+ Key attributes: Room code

+ Related attributes: Room Name

* Floor

+ Key attributes: Floor code

+ Related attributes: Floor Name

* Guest

+ Key attributes: GuestID,

+ Related attributes: Full Name, Phone Number

* Service

+ Key attributes: Service Code

+ Related attributes: Service Name, Amount

* Invoice

+ Key attributes: Invoice code

+ Related attributes: Identity Card Code, Full Name, Number of Days of Stay, Arrival Date, Departure Date, Room Code, Total Room Amount, Total Service Amount, Total Amount to be Paid, Service Name

1. Finding Relationships

* Has:

+ Floor - Room

+ One to many

* Book:

+ Guest - Room

+ Many to many

* Provides

+ Room – Service

+ Many to many

* Includes

+ Invoice – Guest

+ Many to one

* For

+ Invoice – Room

+ Many to one

* Contains

+ Invoice – Service

+ Many to many

1. Finding weak Entities and weak Relationships

* Invoice is a weak entity.

1. Draw an ER model