Draw the ER diagram of the following problems:

Example # 1:

A university has a large number of courses in a catalog. Attributes of course include course number (identifier), name and unit. Each course may have 1 or more different courses as prerequisite or may have no prerequisite. Similarly a particular course may be a prerequisite for any number of courses or may not be prerequisite for any other course.

Example # 2:

A Company sells a number of different furniture products. These products are group into several product lines. The identifier for the product is PRODUCT_ID, while the identifier for a product line is PRODUCT_LINE_ID. The additional attributes for the product are Product description, product finish and unit price. Another attribute for product line is product line name. A product line may group any number of products, but must group at least one product. Each product must belong to exactly one product line.

Customer submit order for products the identifier for order is ORDER_ID, another attribute is order date. A customer may submit any number of orders but need not to submit any order. Each order is submitted by exactly one customer. The identifier for a customer is CUSTOMER_ID. Other attributes include customer name and address.

A given customer order must requisite at least one product. Any product sold by the company may not be requested on nay order or may be requested on 1 or more orders. An attribute associated with each order and product is quantity, which is the number of unit requested.

Company has established sales territories for its customer. Each customer does business in 1 or more of these territories. The identifier for the sales territories is TERRITORY_ID. A sales territory may have any number of customers or may not have any customer doing business.

Create an ERD of the following situation

- An INVOICE is written by a SALESREP. Each sales representative can write many invoices, but each invoice is written by a single sales representative.
- The INVOICE is written for a single CUSTOMER. However each customer can have many invoices.
- The INVOICE can include many detail lines (LINE), which describe the products bought by a customer.
- The product's information is stored in a PRODUCT entity.
- The product's vendor information is found in a VENDOR entity.

Create an ER diagram for the following situations:

Case # 1:

A nonprofit organization depends on a number of different types of persons for its successful operation. The organization is interested in the following attributes for all of these persons: SSN (identifier), Name, Address and Phone. There are three types of persons who are of greatest interest: employee, volunteers and donors. In addition to the attributes for a person, an employee has an attribute called dateHired, and volunteer has an attribute called skill. A donor is a person who has donated one or more items to the organization. An item specified by a name, may have no donor, or one or more donors. When an item is donated the organization records its price, so that at the end of the year, it can identify the top ten donors.

There are persons other than employee, volunteers and donors who are of interest to the organization, so that a person need not belong to any of these three groups. On the other hand, at a given time a person may belong to two or more of these groups (for example, employee and donor).

Case # 2:

A hospital has a large number of registered physicians. Attributes of PHYSICIAN include Physician_ID (identifier) and Speciality. Patients are admitted to the hospital by physicians. Attributes of PATIENT include Patient_ID (identifier) and Patient_Name. Any patient who is admitted must have exactly one admitting physician. A physician may optionally admit any number of patients. Once admitted, a given patient must be treated by at least one physician. A particular physician may treat any number of patients, or may not treat any patients. Whenever a patient is treated by a physician, the hospital wishes to record the details of treatment (Treatment_Detail). Components of Treatment_Detail include Date, Time and result.

Create an ERD of the following situation

- A department employee many employees, but each employee is employed by one department.
- A division operates many departments, but each department is operated by one division.
- An employee may be assigned too many projects, and a project may have many employees assigned to it.
- A project must have at least one employee assigned to it.
- One of the employees manages each department, and each department I managed by only one employee.
- One of the employees runs each division, and each division is run by only one employee.

Develop an ER-Diagram for a symphony orchestra.

CONCERT_SEASON: the season during which a series of concert will be performed. Identifier is Opening_Date, which include Month, Day and Year.

CONCERT: A given performance of one or more compositions. Identifier is Concert_Number. Another important attribute is Concert_Date, which consists of the following: Month, Day, Year and Time. Each concert typically has more than one concert date.

COMPOSITION: Compositions to be performed at each concert. Identifier is Composition_ID, which consists of the following: Composer_Name and Composition_Name. Another attribute is Movement_ID, which consists of two parts: Movement_Number and
Movement_Name. Many but not all, compositions have multiple movements.

CONDUCTOR: Person who will conduct the concert. Identifier is Conductor_id. Another attribute is Conductor_Name.

SOLOIST: Solo artist who will perform a given composition on a particular concert. Identifier is Soloist_Id. Another attribute is Soloist_Name.

During further discussion you discover the following:

a. A concert season schedules one or more concert. A particular concert is scheduled for only one concert season.
b. A concert includes the performance of one or more compositions. A composition may be performed at one or more concerts, or may not be performed.
c. For each concert, there is one conductor. A conductor may conduct any number of concerts, or may not conduct any concerts.
d. Each composition may require one or more Soloists, or may not require a soloist. A soloist may perform one or more compositions at a given concert, or may not perform any composition. A symphony orchestra wishes to record the date when a soloist last performed a given composition (Date_Last_Performed).