**DEPARTMENT OF COMPUTER APPLICATIONS**

**I MCA – DATABASE SYSTEMS – ER MODEL PRACTICE 1**

1. The firm has a number of sales offices in several states. Attributes of each sales office include office number (identifier) and location. Each sales office is assigned one or more employees. Attributes of employee include a unique employee\_ID and the name of the employee. An employee must be assigned to only one sales office. In addition, the database stores the number of employees in each office. For each office, there is always one employee assigned to manage that office. An employee may manage only the sales office to which he/she is assigned.

The firm also lists properties for sale. Attributes of each property include a unique property\_ID and location (address, city, state and zip). Each unit of property must be listed with one (and only one) of the sales offices. A sales office may have any number of properties listed or may potentially have no properties listed. Each unit of property has one or more owners. Attributes of owners are pre-assigned owner\_ID and name. An owner may own one or more units of property. The database also stores the percentage of the property owned by a particular owner.

Prepare an E-R diagram for the above real estate firm that lists property for sale. Your diagram should identify all the entities, relationships, and attributes described above. Indicate primary keys, and the cardinality of each relationship. Create a relational database model to represent the model derived above. For each relation, identify the primary key, and all of its attributes. Also, identify foreign keys of each relation (relational table), if appropriate. Prepare a VISIO diagram showing how the tables are related to each other.

2. In an educational institute, there are several departments and students belong to one of them. Each department has a unique department number, a name, a location, phone number and is headed by a professor. Professors have a unique employee Id, name, phone number. We like to keep track of the following details regarding students: name, unique roll number, sex, phone number, date of birth, age and one or more email addresses. Students have a local address consisting of the hostel name and the room number. They also have home address consisting of house number, street, city and PIN. It is assumed that all students reside in the hostels.

A course taught in a semester of the year is called a section. There can be several sections of the same course in a semester; these are identified by the section number. Each section is taught by a different professor and has its own timings and a room to meet. Students enroll for several sections in a semester. Each course has a name, number of credits and the department that offers it. A course may have other courses as prerequisites i.e, courses to be completed before it can be enrolled in.

Professors also undertake research projects. These are sponsored by funding agencies and have a specific start date, end date and amount of money given. More than one professor can be involved in a project. Also, a professor may be simultaneously working on several projects. A project has a unique projectId.

Design a conceptual schema for the above educational institution. Be sure to indicate all key, connectivity, cardinality constraints and any assumptions you make.

3. Assume we have the following application that models soccer teams, the games they play, and the players in each team. In the design, we want to capture the following:

• We have a set of teams, each team has an ID (unique identifier), name, main stadium, and to which city this team belongs.

• Each team has many players, and each player belongs to one team. Each player has a number (unique identifier), name, DoB, start year, and shirt number that he uses.

• Teams play matches, in each match there is a host team and a guest team. The match takes place in the stadium of the host team.

• For each match we need to keep track of the following:

o The date on which the game is played

o The final result of the match

o The players participated in the match. For each player, how many goals he scored, whether or not he took yellow card, and whether or not he took red card.

o During the match, one player may substitute another player. We want to capture this substitution and the time at which it took place.

• Each match has exactly three referees. For each referee we have an ID (unique identifier), name, DoB, years of experience. One referee is the main referee and the other two are assistant referee. Design an ER diagram to capture the above requirements. State any assumptions you have that affects your design. Make sure cardinalities and primary keys are clear.