

Instructions: Students are required to attempt each question.

Question 1

For each section in this question students are required to develop an **Entity Relationship** diagram from the following information. Relationships identified in your diagrams must show both minimum and maximum cardinality.

(a)

Super Construction is an engineering company that works on several construction projects at any one time. Each project may require a number of employees to work on it and an employee must work on at least one project. The date an employee starts and ends works on a project must be recorded and the number of hours they worked on the project that day must also be recorded. An employee may work on the same project several times and this would be distinguished by the different start and end dates.

An employee must have at least one qualification and that qualification may be held by many other employees. For each qualification held by an employee, the year and the institution it was received from must be recorded.

An employee has at least one title and a title may be held by many employees. The construction company would like to record all the titles an employee has had within the company. The date to and date from should be recorded for each title an employee has had.

A project may require a number of tasks to be completed on it and that same task may be required to be completed on many other projects. The duration time for a particular task on a specific project needs to be recorded. The duration of a task may vary depending on the project.

A project is assigned one employee as its overall manager. An employee may manage many projects but a project is managed by one and only one employee.

Each task may require a number of parts to be used in order to complete it. A part may be used on many tasks or none at all. The number of parts used on a particular task may differ depending on the nature of the project. The number of parts used per task and project needs to be recorded.

Each employee must belong to one department and a department must have at least one employee assigned to it.

An employee may supervise one or more other employees and each employee is supervised by only one supervisor. (Employee)

An engineer must have at least one qualification and that qualification may be held by many other engineers. For each qualification held by an engineer, the year and the institution it was received from must be recorded.

(b) (i)

A doctor consults from one clinic only, but a clinic may have many doctors working from it. A patient makes an appointment to see a doctor on a specific day and time. A patient may consult with many doctors and a doctor must consult with at least one patient.

(ii)

What changes, if any, would need to be made to model developed above in (i), if the following to the scenario was included.

A doctor now works from many clinics and a clinic can have many doctors operating from it. When a patient makes a booking to see a doctor the time, day and clinic must be recorded.

(8 + 4= 12 marks)

Question2:

Students are required to develop an Entity Relationship diagram from the following scenario.

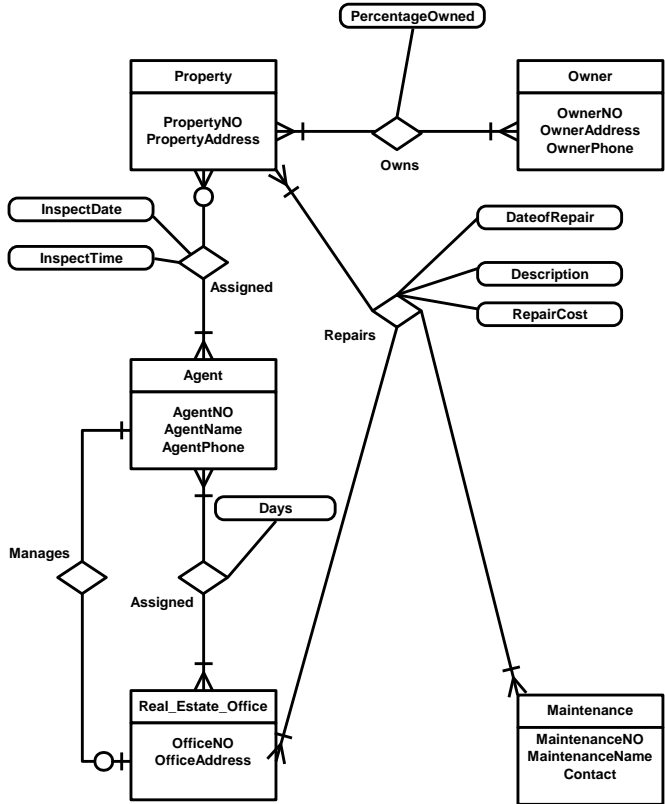
(8 marks)

‘Martial Arts R Us’ (MARU) needs a database. MARU is a martial arts school with hundreds of students. The database must keep track of all the classes that are offered, who is assigned to teach each class, and which students attend each class. Also, it is important to track the progress of each student as they advance. Create a complete Crow’s Foot ERD for these requirements:

- Students are given a student number when they join the school. The number is stored along with their name, date of birth, and the date they joined the school.
- All instructors are also students, but clearly not all students are instructors. In addition to the normal student information, for all instructors, the date that they start working as an instructor must be recorded along with their instructor status (compensated or volunteer).
- An instructor may be assigned to teach any number of classes, but each class has one and only one assigned instructor. Some instructors, especially volunteer instructors, may not be assigned to any class.
- A class is offered for a specific level at a specific time, day of the week, and location. For example, one class taught on Mondays at 5:00 p.m. in Room 1 is an intermediate-level class. Another class taught on Mondays at 6:00 p.m. in Room 1 is a beginner-level class. A third class taught on Tuesdays at 5:00 p.m. in Room 2 is an advanced-level class.
- Students may attend any class of the appropriate level during each week, so there is no expectation that any particular student will attend any particular class session. Therefore, the attendance of students at each individual class meeting must be tracked.
- A student will attend many different class meetings, and each class meeting is normally attended by many students. Some class meetings may not be attended by any students. New students may not have attended any class meetings yet.
- At any given meeting of a class, instructors other than the assigned instructor may show up to help. Therefore, a given class meeting may have a head instructor and many assistant instructors, but it will always have at least the one instructor who is assigned to that class. For each class meeting, the date of the class and the instructors’ roles (head instructor or assistant instructor) need to be recorded. For example, Mr. Jones is assigned to teach the Monday, 5:00 p.m., intermediate class in Room 1. During a particular meeting of that class, Mr. Jones was the head instructor and Ms. Chen served as an assistant instructor.
- Each student holds a rank in the martial arts. The rank name, belt color, and rank requirements are stored. Most ranks have numerous rank requirements, but each requirement is associated with only one particular rank. All ranks except white belt have at least one requirement.
- A given rank may be held by many students. While it is customary to think of a student as having a single rank, it is necessary to track each student’s progress through the ranks. Therefore, every rank that a student attains is kept in the system. New students joining the school are automatically given the rank of white belt. The date that a student is awarded each rank should be kept in the system. All ranks have at least one student who has achieved that rank at some time.

Question 3:

(a) Students are required to develop a set of relational database tables from the following Entity Relationship diagram. Primary and foreign keys must be highlighted.



- (b) Students are required to develop an Entity Relationship diagram from the following set of relational tables. Only the maximum cardinality of each relationship needs to be displayed.

The **Orders** database maintains information on Customers, Sales Representatives, Departments, and Orders.

The *tblCustomer* table maintains information relating to Customers.

The *tblDepartment* table stores information relating to full name of each department.

The *tblSales_Rep* table stores information on all Sales Representatives and the Department they belong to. The field supervisorNO represents a sales rep number who is the current supervisor of a particular sales rep.

The *tblOrder* table stores information relating to Orders, a unique Order number, the date the Order was placed and the Customer who placed the order.

The *tblOrderLine* table maintains information relating to Products that were ordered on each specific Order.

Purchase Price represents the Product's Unit Price at the point of sale.

Products can be stored in many warehouses. The amount of each product stored in a particular warehouse must be recorded.

Each is sourced from one supplier and a supplier can supply many products.

Orders Database

tblCustomer(Cust_NO, F_Name, L_Name, Street, Suburb, Postcode, Balance)

tblDepartment(Depart_NO, Depart_Name)

tblSales_Rep(Sales_RepNO, Surname, F_Name, Depart_NOfk, SupervisorNOfk)

tblOrder(Order_NO, Cust_NOfk, Ord_Date, Sales_RepNOfk, Ord_Status)

tblOrderLine(Order_NO, Product_NO, Qty_Purchased, Purchase_Price)

tblProduct(Product_NO, Prod_Description, Qty_On_Hand, Unit_Price, CategoryNOfk, SupplierNOfk)

tblCategory(CategoryNO, CategoryName)

tblWareHouse(WarehouseNO, WareHouseName)

tblProductStorage(WarehouseNO, ProductNO, Quantity_on_Hand)

tblSupplier(SupplierNO, SupplierName)

(10 + 10= 20 marks)