

Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Computer Science and Technology
100 level 2nd Semester Examination – Dec.-2018/Jan.-2019
CST122-3 Database Management Systems - I



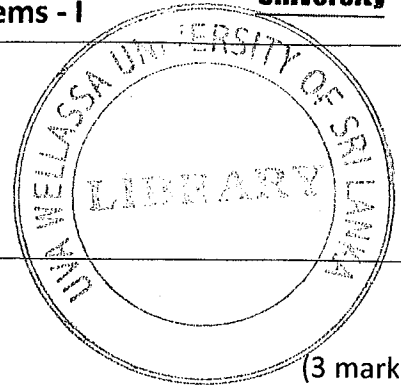
Instructions to candidates

Duration: Two (02) hours

Number of questions: Four (04)

Mark allocation: 100

Answer all questions.



- 1.
- a. List three (03) problems with file-based data processing. (3 mark)
 - b. Explain two (02) disadvantages of Database Management System (DBMS) approach of data processing. (4 mark)
 - c. Briefly explain the **Conceptual level** of the three schema architecture of DBMS approach. (3 mark)
 - d. DML statements are necessary when manipulating a database. Explain how DML helps in data manipulation. (3 mark)
 - e. Explain the difference between the following terms in relational databases with examples.
 - i. Primary key and Foreign key
 - ii. Candidate key and Alternate key(8 mark)
 - f. Consider the relational schemas given below.

Supplier (SupID, Fname, Mname, Lname, ContactNo)

Part (PartNo, PartName, Desc, UnitMeasured)

Project (ProID, Pname, Location, ManagerName)

Supplies (SupID, PartNo, ProID, Qty)

Write the relational algebra expressions for the following statements.

- i. Select the projects situated in 'Badulla'. (3 mark)
- ii. Display the full names (Fname, Mname and Lname) of all the suppliers. (3 mark)
- iii. Display the part names those are measured in 'Centimeters'. (3 mark)

- 2.
- a. Briefly explain the term **degree of a relationship type** in Entity Relationship (ER) diagrams with examples. (3 mark)
 - b. Explain the difference between **overlap** and **disjoint** in Enhanced Entity Relationship (EER) diagrams. (3 mark)

- c. Draw an ER diagram for the following vehicle manufacturing company scenario. Clearly indicate all the cardinality ratios, participation constraints in the diagram. Write all the assumptions you have made when drawing the diagram.

A vehicle manufacturing company produces several types of vehicles. Same vehicle can be requested by many customers. A vehicle is identified by a unique id. The type, model, price, color and the status of the vehicle are recorded in the database. Once a customer requests a vehicle, the company records the customer details with a unique customer number, name, address and the contact number. Customer can confirm the request by placing an order. An order is identified by an order id and the order date has to be stored in the database. More than one vehicle may be included in one order. For each order, the quantity is recorded from each vehicle. Vehicles may need some additional parts and the customers can purchase those parts from the company. A part has an identification number, name and the unit price. If a customer purchase a part, the quantity should be recorded in the database.

(12 mark)

- d. Briefly explain the **m:n (many-to-many)** cardinality ratio by giving an example from the scenario given in part (c). (2 mark)
- e. Derive the relational schema corresponding to the ER diagram of a company scenario given in the Figure 1 (Page 3). (10 mark)

3.

- a. Database normalization is a process of decomposing unsatisfactory relations into smaller relations.
- Explain the term **Partial Functional Dependency** with a suitable example. (5 mark)
 - What are the things need to be considered when decomposing a database into 2nd normal form (2NF)? (5 mark)

- b. Consider the following relations and the given dependencies; D1, D2, D3 and D4.

Project (ProjectNo, ProjectName)

Employee (ENo, Ename, JobClass, ClassHours)

Assign (ProjectNo, Eno, Hours)

D1: ProjectNo -> ProjectName

D2: Eno -> Ename, JobClass, ClassHours

D3: JobClass -> ClassHours

D4: ProjectNo, ENo -> Hours

- Identify the normal form that the above relations are in. Justify your answer. (4 mark)
- Decompose the above relations up to 3NF from the identified normal form. (6 mark)

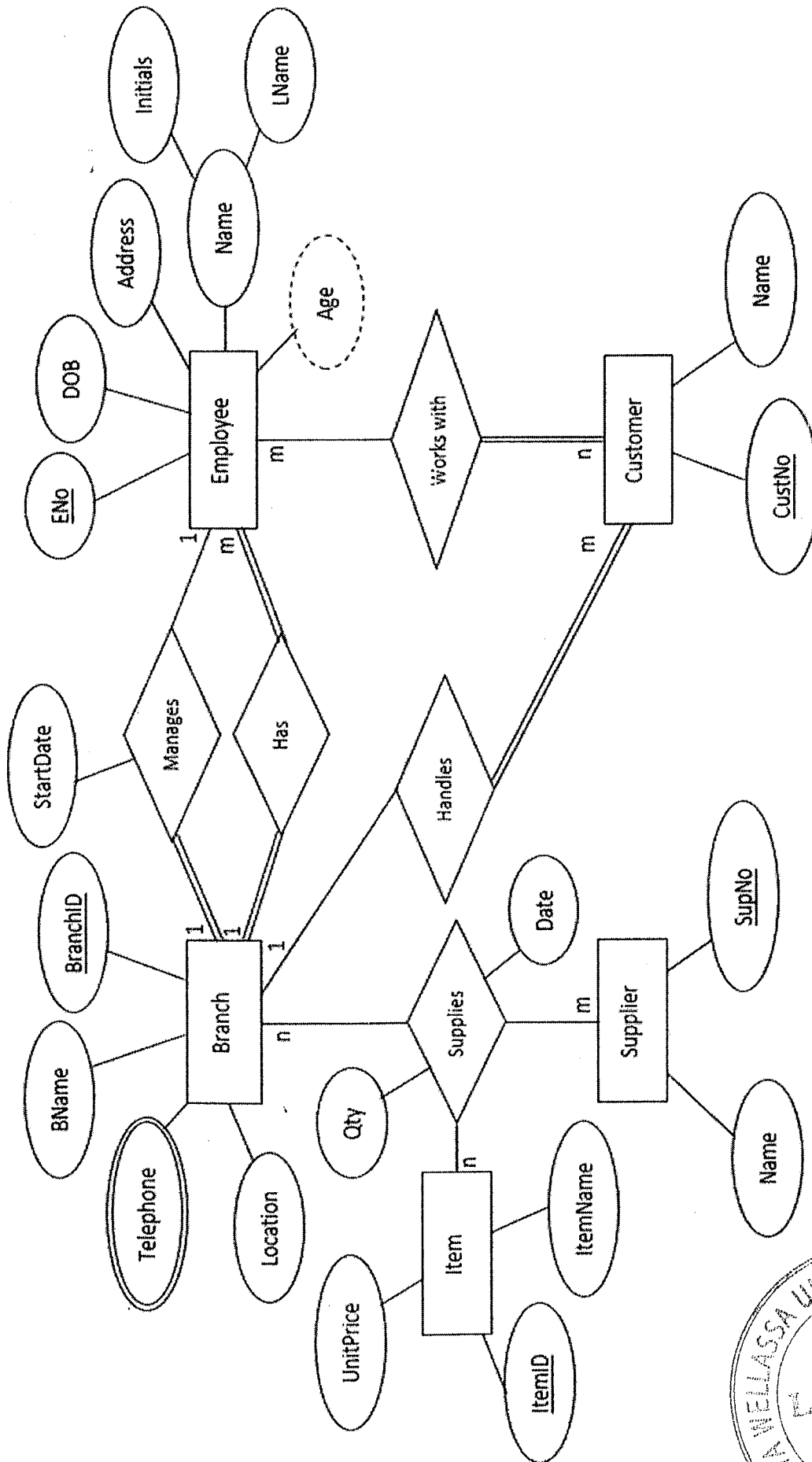


Figure 1: ER diagram of a company scenario



4.

- a. You have been given the following **Vehicle** table with the constraints.
(Note: Assume that the **Manufacturer** table has been already created with the primary key; *ManufacturerID*.)

Field Name	Data Type	Field Size	Constraints
VehicleID	char	5	Primary Key
Model	varchar	20	Not Null
Price	double	7,2	Default: 0.00
RegisteredDate	date		
ManufacturerID	char	3	Foreign Key

Table 1: Vehicle

Write SQL statements;

- i. To create the **Vehicle** table. (4 mark)
 - ii. To add a column to the **Vehicle** table to record the maximum speed of the vehicle. (3 mark)
 - iii. To rename the **Vehicle** table to **Vehicle_New**. (3 mark)
- b. Consider the following schemas of tables and write SQL statements to perform the tasks given in the questions from i to iv.
- Customer** (CustomerID, CustomerName, ContactNo, RegisteredDate)
Product (ProductID, ProductName, MeasurementUnit, UnitPrice_LKR)
SalesOrder (OrderNo, CustomerID, ProductID, OrderDate, QtyOrdered)
- i. Display the customer names containing the letter 's' in the name. (2 mark)
 - ii. Retrieve the products greater than 1000 LKR. (2 mark)
 - iii. List all the products with the unit price ordered on 01st of January 2019. (3 mark)
 - iv. Display the total quantity ordered from the products measured in 'kilograms' with the product name sorted in descending order. (3 mark)