

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
CST104-3 Database Management Systems



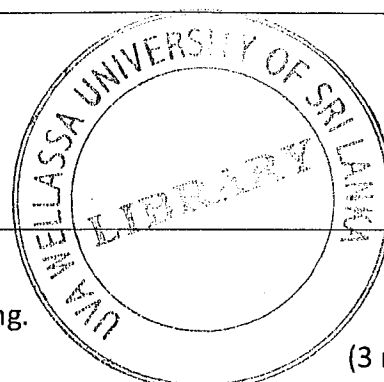
Instructions to candidates

Duration: Three (03) hours

Number of questions: Six (06)

Mark allocation: 100

Answer all questions.



1.
 - a. List three (03) problems with file-based data processing. (3 mark)
 - b. Briefly explain the **conceptual level** of the three schema architecture in the database approach. (3 mark)
 - c. In which situations we need to use DDL statements? Give two (02) examples for DDL statements. (3 mark)
 - d. Write short notes on the following keys in the relational data model with examples.
 - i. Primary key
 - ii. Super key
 - iii. Candidate key
 - iv. Composite key(8 mark)
 - e. Explain domain constraint in relational model with a suitable example. (3 mark)
2.
 - a. List two (02) characteristics of user **views**. (2 mark)
 - b. 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. Display all part names with the description. (2 mark)
 - ii. Select all the projects managed by 'S.A.S. Perera'. (2 mark)
 - iii. Display the part numbers and names measured by 'Liters'. (2 mark)
 - iv. Display the cartesian product of suppliers and parts. (2 mark)

3.

- a. Briefly explain the difference between **total participation** and **partial participation** by giving an example. (4 mark)
- b. Explain the **super-class, sub-class concept** in Enhanced Entity Relationship (EER) model. (4 mark)
- c. Draw ER diagrams for the following scenarios. Suggest attributes for each entity as necessary. Clearly indicate all the cardinality ratios, participation constraints in the diagram. Write all the assumptions you have made when drawing the diagrams.
 - i. The music database stores details of artists, albums, and tracks. An album is made by exactly one artist. But an artist makes one or more albums. An album contains one or more tracks. Artists and albums have unique identification numbers. Artists, albums, and tracks each have a name and the type of the album is also recorded in the database. Each track is on exactly one album. A track has a length, measured in seconds. (6 mark)
 - ii. An e-tuition class records the details of the students, courses, sections and lecturers. A course contains many sections and the students can enroll for several courses at a time. The courses are conducted by one particular lecturer and one lecturer can conduct many courses. When students complete a course, a certificate is given. For each student, the course completion date and the marks obtained for the course has to be recorded. (6 mark)

4.

- a. What is a database schema? (1 mark)
- b. Explain the procedures to be followed when designing the schema from ER diagrams for the following situations.
 - i. An entity with a derived attribute. (2 mark)
 - ii. A m:n relationship with a simple attribute of the relationship type. (2 mark)
- c. Derive the relational schema corresponding to the ER diagram of a company scenario given in the Figure 1 (Page 3). (10 mark)

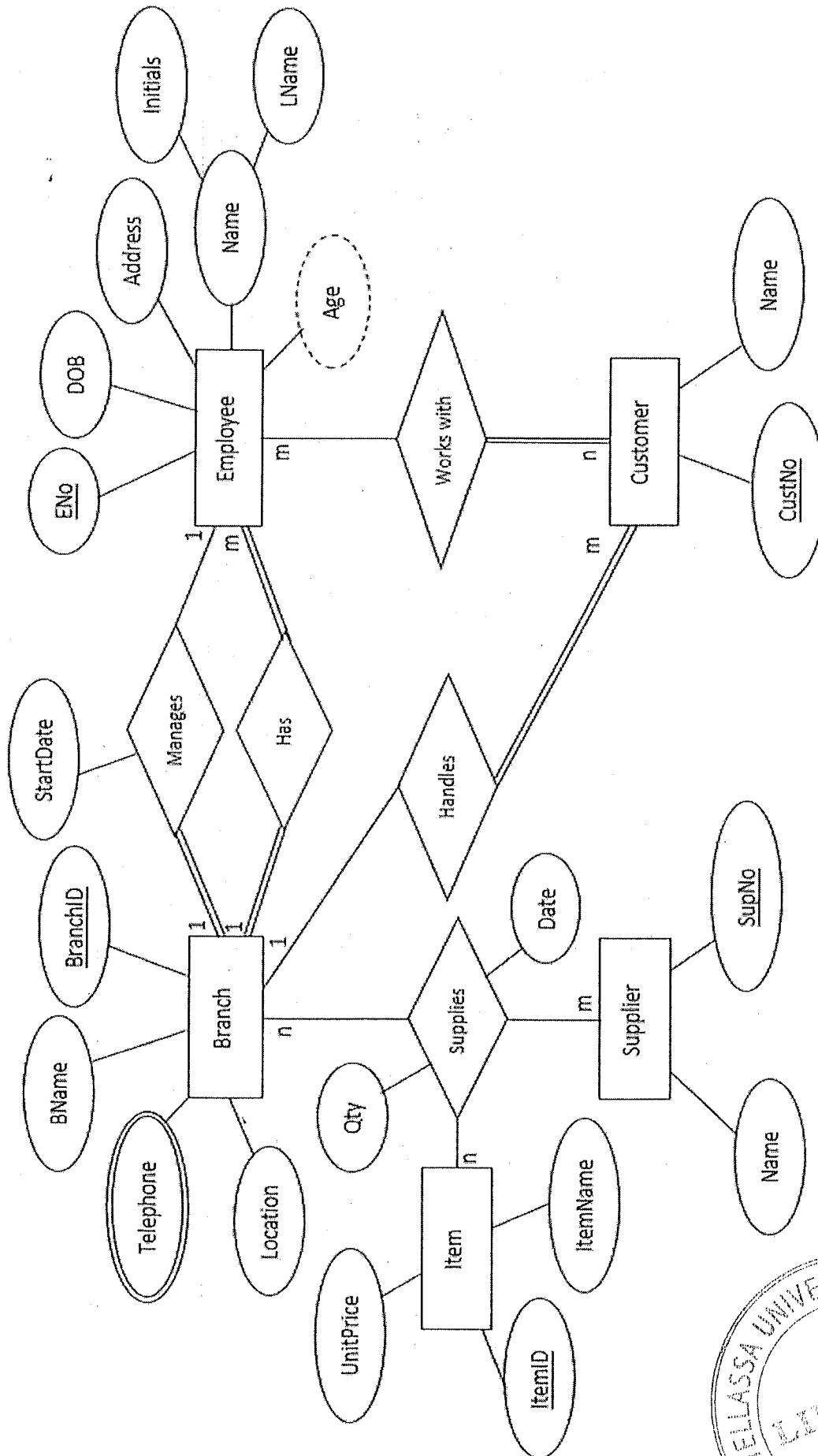
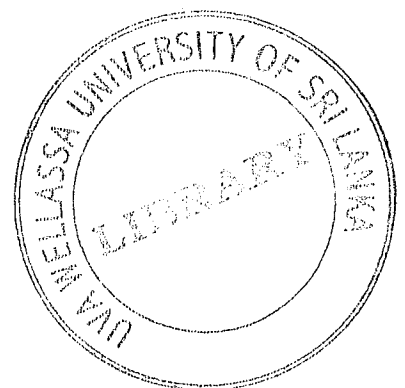


Figure 1: ER diagram for a company scenario



5.

a. What is a **full functional dependency**? Explain with a suitable example.

(2 mark)

b. The following relation is given in ONF.

<u>Purchase Order No</u>	<u>Purchase Order Date</u>	<u>Employee Code</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Part No</u>	<u>Description</u>	<u>Part Quantity (kg)</u>
100011	01-01-15	E002	S2	ABC Enterprises	P1	Sugar	100
					P2	Samba Rice	50
					P3	B Onion	10
					P5	Red Kekulu	30
100012	15-01-15	E003	S4	XYZ Co. Ltd.	P2	Samba Rice	100
					P5	Red Kekulu	20
100013	01-02-15	E001	S1	BCD Ltd.	P1	Sugar	80
					P3	B Onion	20
100014	15-02-15	E005	S5	BDC Services	P6	Potato	10
100015	02-03-15	E004	S2	ABC Enterprises	P7	Nadu Rice	20
100016	15-03-15	E004	S3	PGR Corporation	P8	Red Onion	10

i. What are the three (03) types of anomalies that can be occurred in databases due to data redundancy? Explain those briefly using the above ONF relation.

(6 mark)

ii. Normalize the above relation into 1NF, 2NF and 3NF. Clearly identify all the primary keys of the relations in each step.

(Note: Indicate only the column names.)

(7 mark)

6.

a. Assume that you have created the following Customer table without constraints.

Customer (CustomerID, CustomerName, ContactNo, RegisteredDate)

i. Write the SQL statement to make CustomerID as the primary key of the table.

(3 mark)

ii. The contact number should be a unique field in the customer table. What is the corresponding SQL statement to make that field unique?

(3 mark)

b. Assume that a library is having a database called **LibraryDB** to maintain the book details and borrowing details. Consider the following schemas of tables and write SQL statements to perform the given tasks.

Book (BookID, Title, ISBN, Category, Price_Rs, PubID)

Publisher (PubID, PubName, Location, ContactNo)

Borrower (BorrowerID, BorrowerName, Gender, Age, Phone, RegisteredDate)

BookBorrow (BorrowerID, BookID, Date)

- i. Display the title and the ISBN of the books in 'Sinhala Novels' category. (2 mark)
- ii. Display the publishers who have published books with the price less than Rs.1000. (2 mark)
- iii. How many books are there in the library with the title starting from letter 'S'? (2 mark)
- iv. Find the title of the book with the highest price using SQL functions. Alias the column as 'Highest Price Book'. (2 mark)
- v. Display the details of the 'Female' borrowers who have borrowed books those published by 'Godage' publishers or 'Suriya' publishers. (2 mark)
- vi. List all book borrowers those who have borrowed books in year 2018. (2 mark)
- vii. Find the number of book publishers who have registered in the library. (2 mark)

