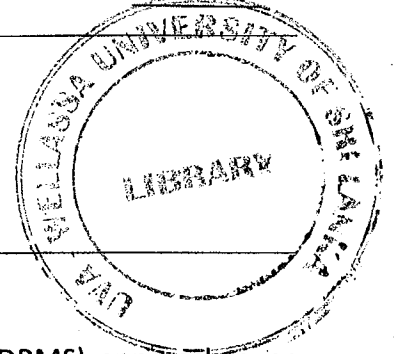


Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Computer Science and Technology
100 level 2nd Semester Examination – Dec. / Jan. 2017
CST104-3 Database Management Systems



Instructions to candidates

Duration: Three (03) hours

Number of questions: Six (06)

Mark allocation: 100

Answer all questions.

- 1.
- a. List three (03) advantages in Database Management Systems (DBMS) approach over traditional file-based approach and give two (02) examples for DBMSs.
(5 mark)
 - b. Briefly explain the levels in **Three Schema Architecture** used in the database approach.
(6 mark)
 - c. Briefly explain the importance of DCL statements in SQL and state two (02) DCL statements with their descriptions.
(4 mark)
 - d. Explain the usage of a composite key in relational databases with an example.
(5 mark)
- 2.
- a. What are SQL aliases?
(2 mark)
 - b. Consider the relational schemas given below.
Patient (PatientNo, Name, DOB, Gender, Address, TpNo, WardNo, AdmittedDate)
Doctor (DoctorID, Name, ContactNo, Specialization, BasicSalary)
Medical_History (TreatmentID, PatientNo, DoctorID, TreatmentDate, Drug, Dosage, Quantity)

Write the relational algebra expressions for the following statements.
 - i. Display all the doctors' names with their specialization areas.
(2 mark)
 - ii. Select the patients who have admitted before 15th of December 2016.
(2 mark)
 - iii. Display the patient names and the gender who are in ward 'W2'.
(2 mark)
 - iv. Display the doctors' names who are specialized in 'Neurology' and earning more than Rs.100,000.
(2 mark)

3.

- a. What is the difference between strong entities and weak entities in Entity Relationship (ER) diagrams? (2 mark)
- b. Briefly explain the two (02) types of **participation constraints** in ER diagrams using examples. (4 mark)
- c. What are the main two (02) types of constraints on specialization and generalization in Enhanced-Entity Relationship (EER) diagrams? Explain one (01) with examples. (4 mark)
- d. Draw an Entity Relationship (ER) diagram for the following scenario. Clearly indicate all the cardinality ratios, participation constraints in the diagram. Write all the assumptions you have made when designing the diagram.

The ABC library uses a database to store the information about books and its members. Each book has a unique identification number, title, category, price and published year. The authors are identified by the author id and they record the name and the contact number of the author. One book can have multiple authors. For each book, publisher's details such as publisher id, name and address are also recorded. Members can borrow books from the library. When a person becomes a member, the library gives a member id, and records the name, address, contact number (can have multiple numbers) and the registered date. When a member borrows books, the issued date and the returned date have to be recorded. Books may have several copies in the library.

(10 mark)

4.

- a. What is a database schema? (1 mark)
- b. Briefly explain the process of mapping a weak entity type in schema designing. (2 mark)
- c. Suppose there is a **1:m relationship with a simple attribute of the relationship type** in an ER diagram. What is the procedure to be followed when designing the schema for that situation? (2 mark)
- d. Derive the relational schema corresponding to the ER diagram of a university scenario given in the Figure 1 (Page 3). (10 mark)

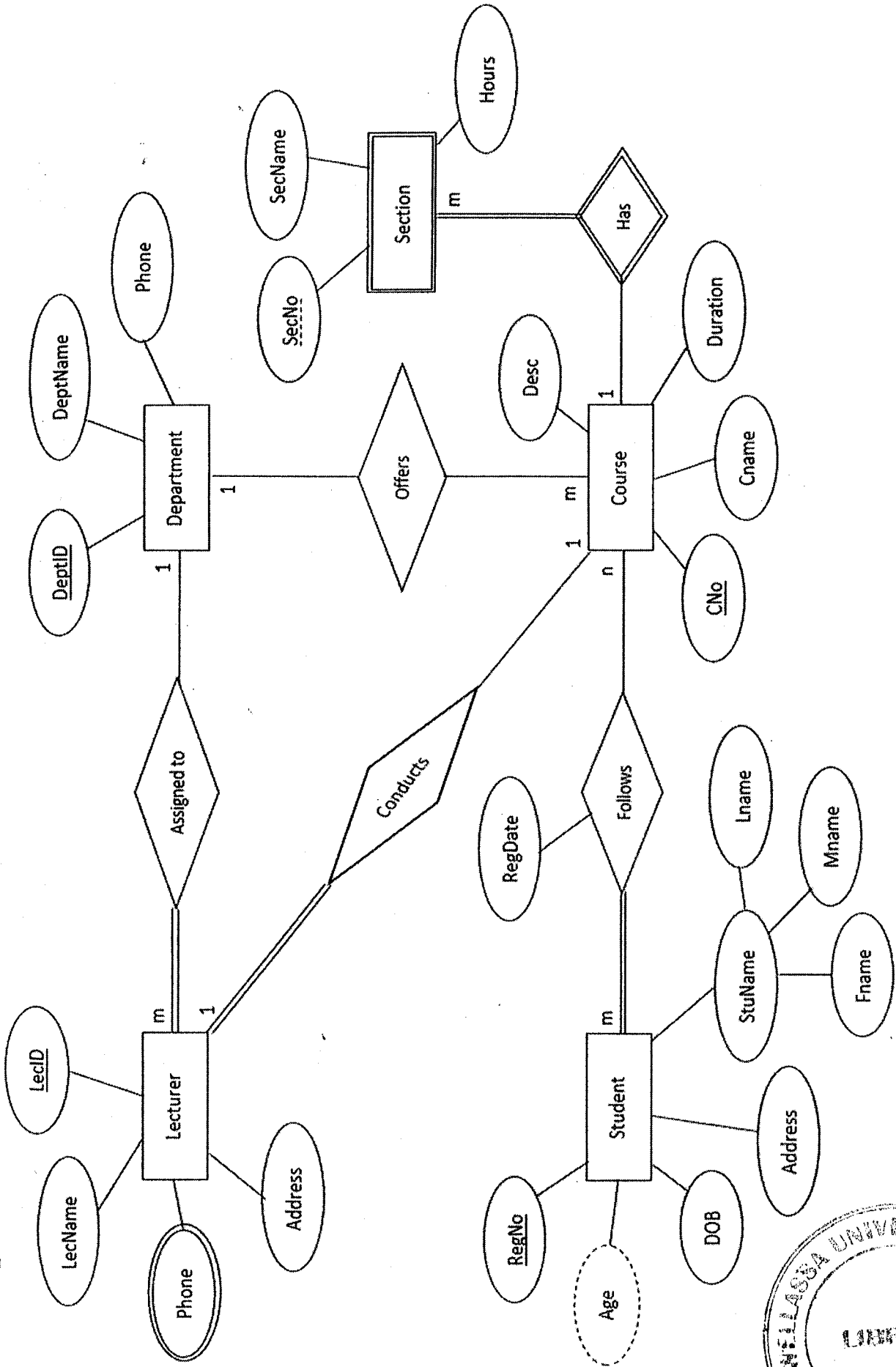


Figure 1: ER diagram for a university scenario



5.

a. State two (02) purposes of normalization.

(2 mark)

b. Assume that the following Customer_Property relation is in 1NF.

<u>Customer No</u>	<u>Property No</u>	PLocation	RentStart	RentFinish	Rent Rs	Owner No	OwnerName
C001	P4	Galle	01-07-2015	30-06-2017	1000	OW1	Silva
C001	P16	Kandy	01-08-2015	31-12-2015	2500	OW2	Perera
C002	P4	Galle	01-01-2016	31-05-2016	1000	OW1	Silva
C002	P36	Badulla	16-08-2016	15-12-2016	1500	OW3	Ariyasena
C002	P16	Kandy	01-01-2016	31-12-2016	2500	OW2	Perera

i. What are the functional dependencies that appear in the above relation?

(2 mark)

ii. Explain those functional dependencies using the attributes in the above relation.

(4 mark)

iii. Decompose the Customer_Property relation into 2NF and 3NF. Clearly identify all the primary keys of the relations in each step.

(Hint: Write only the table headings of the relations.)

(7 mark)

6. ABC bank has many branches island wide. It maintains a database containing the records of its branches, customers, their account details and transactions. The relevant database schema is given below. Primary keys are underlined.

Branch (BranchID, BranchName, Location)

Customer (CustomerID, Name, Address, NIC, Age, BranchID)

Account (AccountNo, Balance, CustomerID)

Transaction (TransactionID, Amount, Date, CustomerID, AccountNo)

a. Assume that the Branch, Customer and Account relations have been created for you. Write the SQL statement to create the Transaction table using the following details.

Field Name	Type	Size	Constraints
TransactionID	Text	8	Primary Key
Amount	Decimal	10,2	Not Null
Date	Date		
CustomerID	Text	5	Foreign Key
AccountNo	Text	5	Foreign Key

(4 mark)

b. Write SQL statements to perform the following tasks using the above database.

- i. Retrieve details of all the customers and their bank accounts. (2 mark)
- ii. Update the balance of the account number '1112032' by adding Rs.10,000 to the existing balance. (2 mark)
- iii. Remove the record with the account number '1002032' from the 'Account' relation. (2 mark)
- iv. Display the ID and the name of the youngest customer who has an account in 'Badulla' branch using SQL functions. (2 mark)
- v. Display the customers whose names starting with the letter 'S'. (2 mark)
- vi. Retrieve the list of customers who have more than three (03) bank accounts and a total balance of above Rs.50,000. (3 mark)
- vii. Create a view called 'Customers_Borella' to include all the customer details who maintain an account in the 'Borella' branch. (3 mark)

