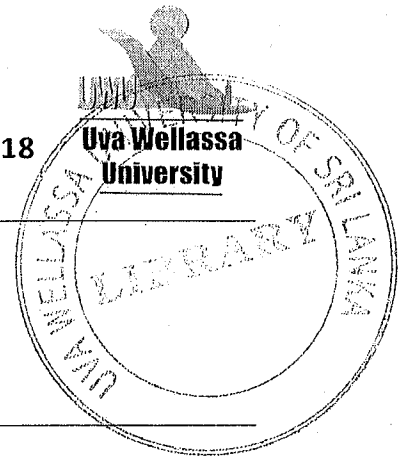


Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Computer Science and Technology
100 level 2nd Semester Examination – Dec.-2017/Jan.-2018
CST104-3 Database Management Systems



Instructions to candidates

Duration: Three (03) hours

Number of questions: Six (06)

Mark allocation: 100

Answer all questions.

1.
 - a. Database Management System (DBMS) is a collection of programs that enables users to create and maintain a database.
 - i. List four (04) functions of a DBMS. (4 mark)
 - ii. Give two (02) examples for DBMSs. (1 mark)
 - b. Briefly explain the **external level** of the schema architecture in the database approach. (3 mark)
 - c. In which situations we need to use DCL statements? Give two (02) examples for DCL statements. (3 mark)
 - d. What is the usage of a composite key in relational databases? Explain using an example. (4 mark)
 - e. Explain referential integrity constraint in relational model with a suitable example. (5 mark)
2.
 - a. Explain two (02) benefits of user views. (2 mark)
 - b. Consider the relational schemas given below.

Student (StuID, StuName, DOB, Address)

Course (CID, CName, Credits, LecID)

Marks (StuID, CID, Marks)

Instructor (LecID, Lname, ContactNo, Address)

Write the relational algebra expressions for the following statements.

 - i. Display all the student names with their address. (2 mark)
 - ii. Select all the three (03) credit courses. (2 mark)
 - iii. Display the student IDs who have obtained the marks more than 75 for the course 'C001'. (2 mark)
 - iv. Find the students who are working as instructors while studying. (2 mark)

3.

a. Write short notes on the following terms in Entity Relationship (ER) model.

- i. Derived attributes
- ii. Weak entities
- iii. Total participation

(6 mark)

b. Briefly explain the term **overlap** regarding disjointness constraint in Enhanced Entity Relationship (EER) model with an example.

(2 mark)

c. Draw ER diagrams for the following scenarios. Suggest attributes for each entity. Clearly indicate all the cardinality ratios, participation constraints in the diagram. Write all the assumptions you have made when drawing the diagrams.

- i. A vehicle manufacturing company produces several types of vehicles. Same vehicle can be requested by many customers. 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 to buy vehicles. More than one vehicle may be included in one order. For each order, the quantity is recorded from each vehicle that the customer buys.

(6 mark)

- ii. A university contains many faculties. The faculties are divided into several departments those identified by a department ID. Each department offers number of courses and each course contains many sections. Each section has a section name and number of hours. Lecturers can teach many courses and even the same course can be conducted by many lecturers. The students can enroll in many courses and a course can contain many students. Index number, name, date of birth, age and address of each student are recorded.

(6 mark)

4.

a. What is a database schema?

(1 mark)

b. Briefly explain the process of mapping a multivalued attribute in schema designing.

(2 mark)

c. Suppose there is a 1:1 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 hospital scenario given in the Figure 1 (Page 3).

(10 mark)

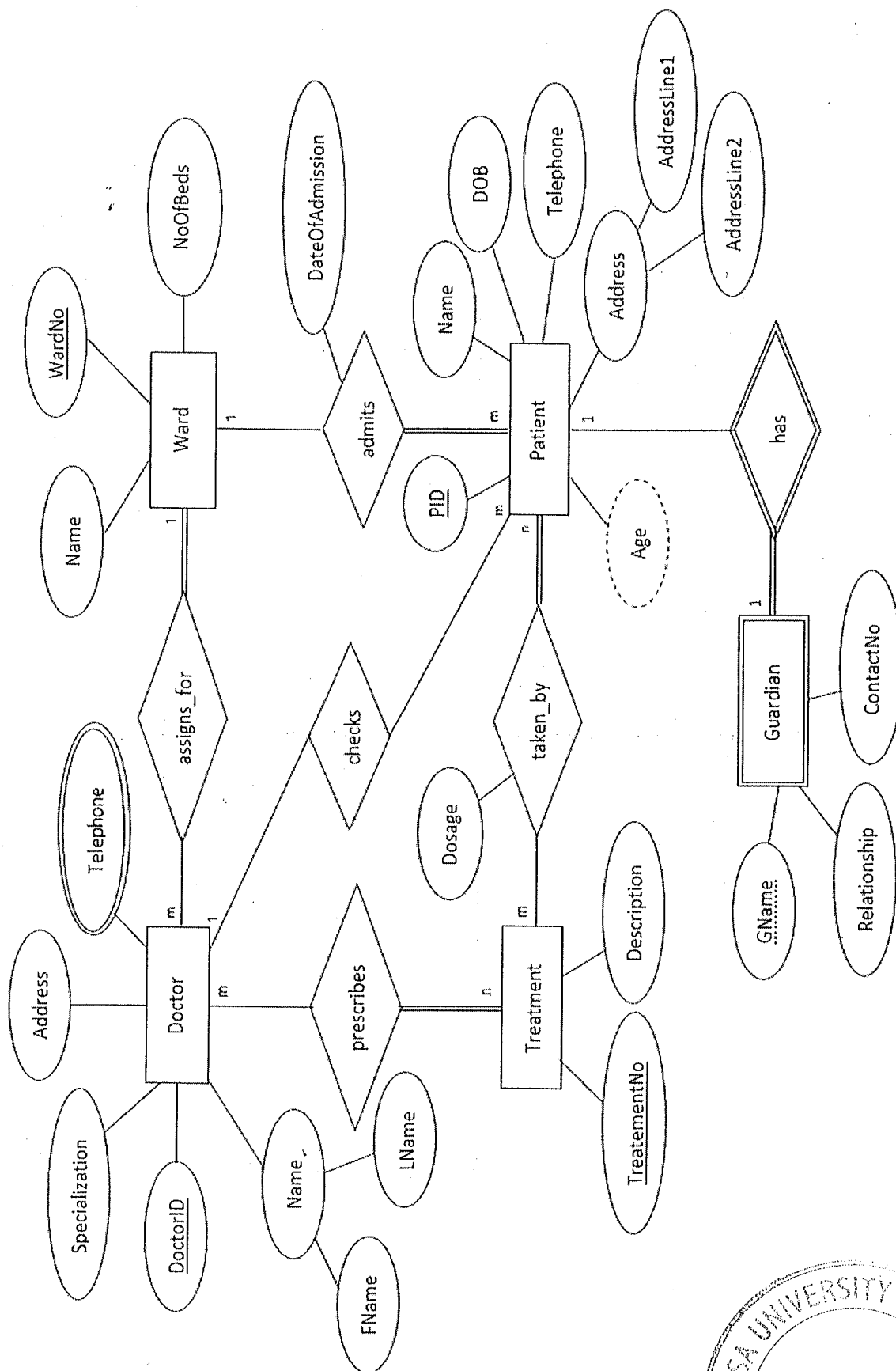
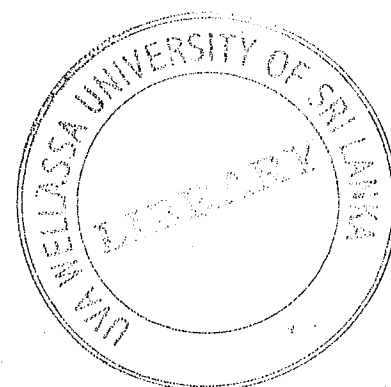


Figure 1: ER diagram for a hospital scenario



5.

- a. What is a transitive dependency? Explain with a suitable example.

(3 mark)

- b. Assuming that the following relation is in 1NF, explain the term partial functional dependency using the **Customer** relation.

Customer = {CustomerNo, ItemNo, CustomerName, City, Street, ItemName, Qty}

(4 mark)

- c. You have been given the following relation regarding an animal clinic which is in ONF.

PetHealth (PetID, PetName, Type, Age, OwnerName, VisitDate, TreatmentNo, Description)

Decompose the **PetHealth** relation into 1NF and 2NF relations separately (Write only the field names).

Pet ID	Pet Name	Type	Age	Owner Name	VisitDate	Treatment No	Description
110	Lucky	Dog	2	A.P. Perera	10/01/2016	1	Rabies Vaccination
					18/02/2016	4	Wound in Leg
115	Kitty	Cat	4	C. Silva	18/02/2016	1	Rabies Vaccination
					20/04/2016	3	Tetanus Vaccination
					20/04/2016	5	Annual Checkup
194	Teek	Bird	1	T.D. Alwis	10/01/2016	5	Annual Checkup
150	Tom	Dog	1	C. Silva	30/05/2016	1	Rabies Vaccination

(Note: One pet can be given several treatments at the same visiting date.)

(8 mark)

6.

- a. You have been given the following **Student** table with the constraints.

Field Name	Data Type	Field Size	Constraints
StudentID	char	5	Primary Key
StudentName	varchar	30	Unique
Age	int	3	Default: 20
Address	Varchar	50	Not Null
RegisteredDate	date		
DegreeCode	char	3	

- i. Write the SQL statement to create the **Student** table.

(4 mark)

- ii. Assuming that the Degree table has been created before, make the DegreeCode as the foreign key in Student table which refers DegreeCode of the Degree table.

(2 mark)

- b. Assume that the 'Watch & Fun' movie theater is having a database to maintain the movie details, hall details and movie show details. Consider the following schemas of tables and write SQL statements to perform the tasks given in the questions from i to v.

Movie (MovieID, MovieName, Category, Duration)

Hall (HallNo, Name, Location, MaxCapacity)

MovieShow (MovieID, HallNo, Date, Time, NoOfAudience)

- i. Display all the movie names and their durations in '3D movie' category. (2 mark)
- ii. List all the movie names along with the categories those play on 31st of December 2017. (2 mark)
- iii. How many halls are there in the movie theater those are having more than 50 of the maximum capacity? (2 mark)
- iv. Display the total number of audience for each movie in each day. (2 mark)
- v. Display the hall names those play the movies starting from letter 'K'. (2 mark)
- vi. Display all the movies showed in year 2016. (2 mark)
- vii. How many different categories of movies are there? Alias the column as 'Movie Categories'. (2 mark)

