

UNIVERSITY OF RUHUNA  
BACHELOR OF COMPUTER SCIENCE (GENERAL) DEGREE LEVEL I (SEMESTER II) EXAMINATION  
JANUARY 2018

COURSE UNIT: CSC 1213 (Database Management Systems)

Duration: 2 Hours

*Answer All Questions.*

1.

a)

- (i) Describe the limitations of traditional File-Based Approach.
- (ii) Briefly explain the major disadvantages of a database system.

b)

- (i) Describe the Three Schema Architecture of a Database Management System by using a suitable diagram.
- (ii) Name and define two types of data independence of a Database System.

c) Explain briefly the role of the following database users:

- (i) Database Administrator (DBA)
- (ii) Database Designer

2.

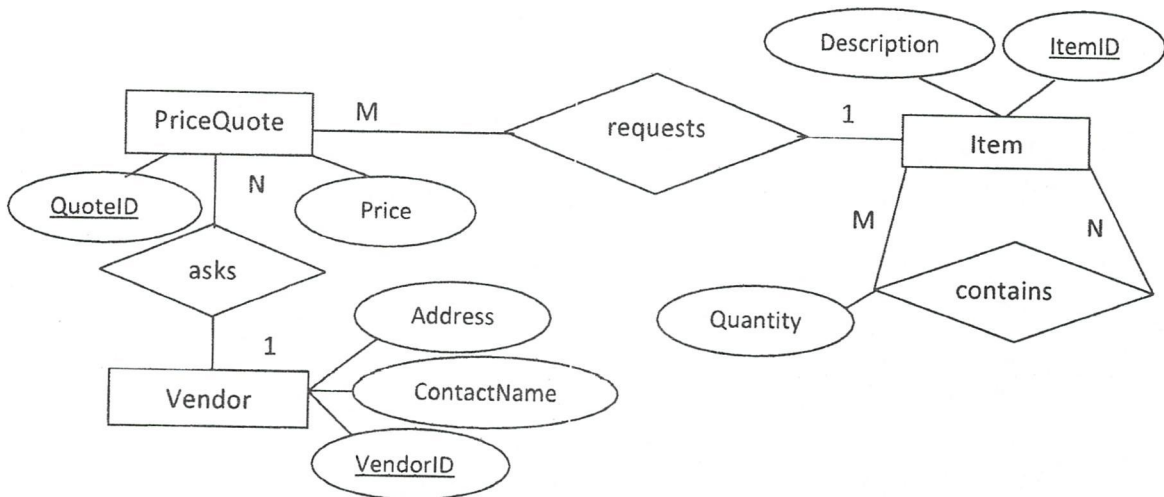
a) Consider the following requirements for a university database.

The university keeps track of each student's name, student number (unique), address, birth date, sex and degree program. Students in the university follow several subjects (e.g. Computer Science, Mathematics). A subject has a name, subject code and a lecturer who coordinates the subject. Both name and code have unique values for a subject. A subject consists of different courses (e.g. Internet Programming, DBMS). A course has a name, code (unique), type (e.g. core/optional) and course content. Lecturers have the responsibility of teaching courses. Each lecturer's name, employee number (unique), grade, appointment date and telephone numbers are recorded. A lecturer may have several telephone numbers. One course can be taught by several lecturers and a lecturer may teach any number of courses. University wants to keep track of qualifications of each lecturer for promotion purposes. They keep topic of each qualification (unique for a particular lecturer), effective date and offered institute.

- i. Identify entities, attributes of each entity, and key attribute(s) for each entity (if any).
- ii. Design an ER diagram for the above requirements. State clearly all your assumptions, if any.

*Contd....*

- b) Map the following ER diagram into a relational database schema. Specify all primary keys and foreign keys of relational schema.



3.

- a) Explain why one would normalize a Database Schema.
- b) Consider the following "CAR\_SALE" relation which stores information of cars, dates sold, sales persons, commissions and discount amounts.

**CAR\_SALE(Car#, DateSold, Salesman#, Commission, DiscountAmount)**

Assume that a particular car may be sold by multiple salesmen on different dates. Hence consider {Car#, Salesman#} is the primary key of the relation.

Additional dependencies are as follows:

DateSold → DiscountAmount

Salesman# → Commission

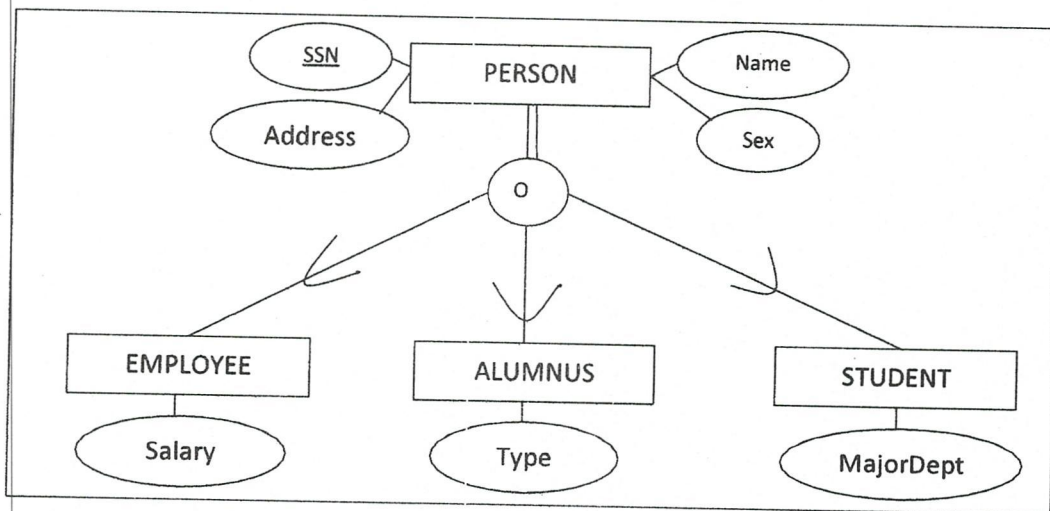
- (i) Indicate the normal form of the relation given above? Justify your answer.  
 (ii) Apply normalization till 3NF.

Contd....

4.

a)

- (i) Discuss the importance of Extended Entity Relationship (EER) Modelling.
- (ii) Explain the difference between the process of specialization and the process of generalization using suitable examples.
- (iii) Map the following EER into relations.



b) Consider the following relations:

EMPLOYEE (empId, name, address)  
PROJECT (projectID, projectName, deadline)  
WORKSON (projectID, empID)

Express the following queries in *Relational Algebra* and *Tuple Calculus*.

- (i) Get employee identification numbers (empId) of employees whose name are "Dias".
- (ii) Find names of employees who work on the project P8.
- (iii) Find employee names of employees who do not work on any project.

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