UNIVERSITY OF MORATUWA
Faculty of Information Technology

Bachelor of Information Technology (BIT)
Level 2 – Semester 1 Examination

ITE 2422 - DATABASE MANAGEMENT SYSTEMS

Time Allowed: 3 hours | November 2019

INSTRUCTIONS TO CANDIDATES

1. This paper contains 4 questions on 4 pages.
2. The total marks obtainable for this examination is 100. The marks assigned for each question & sections thereof are included in square brackets.
3. This examination accounts for 60% of the module assessment.
4. This is a closed-book examination.
5. Calculators are not allowed.
6. Answer **All** questions.

ADDITIONAL MATERIAL

None

Continued...

Question 1 *[25 Marks]*

(a) List FOUR (4) characteristics of a database.

[4 Marks]

(b) Describe the difference between end user data and meta data.

[4 Marks]

(c) List THREE (3) advantages of a centralized database system.

[6 Marks]

(d) Explain domain constraint and entity integrity constraint using a suitable example.

[6 Marks]

(e) Describe ANSI-SPARC Architecture using a diagram.

[5 Marks]

Question 2 *[25 Marks]*

(a) The university library requires a database to support the processing of their book loan facility.

Each book maintained in the library has a title, a unique ISBN (an international code for all published work), published year, authors (there could be multiple authors), and number of pages in a book.

There are multiple copies of the same book. Each copy has a unique identification code. Each copy has a shelf number to indicate where it is stored.

Borrower has a registration number, full name, contact number, email address and registration date. Borrower can borrow one book at a time. There may be borrowers who are yet to take out a loan.

Over time a copy may be out on loan many times or it may never be loaned out. A loan is made by a single borrower for one copy of a book.

Database will store the date borrowed the book and the date to return the book.

Draw an Entity Relationship (ER) diagram that includes the following:

- Entity types assigned with the attributes (Indicate which attributes represent Primary keys).
- Relationships between the entity types.
- Relationship cardinality.

State any necessary assumptions you make.

[16 Marks]

Continued...

(b) Write the relational schema for the Enhanced Entity Relationship (EER) diagram given below (Figure 2.1).

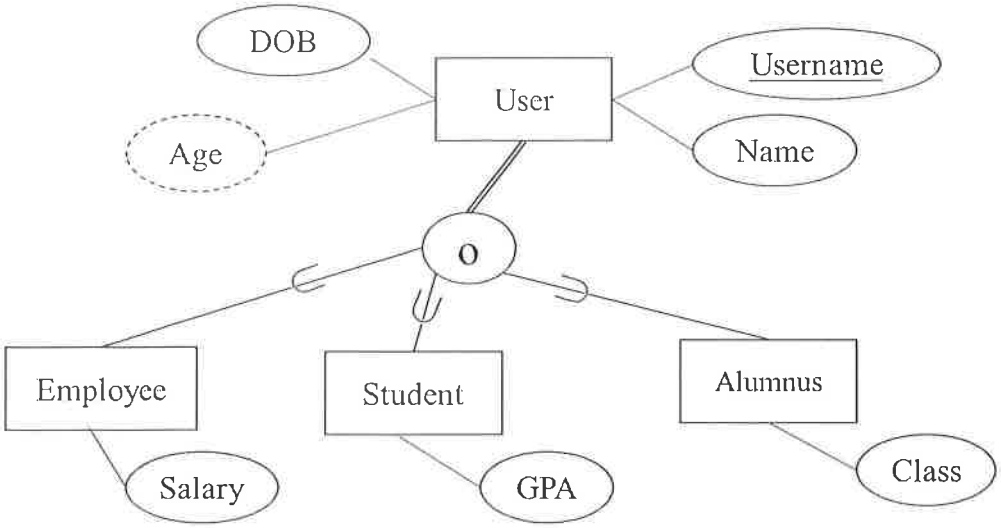

Figure 2.1: Segment of an EER diagram

[9 Marks]

Question 3 ***[25 Marks]***

(a) Suppose that there is a relational database with the following relations (Primary keys are underlined).

Movie (MovieId, Title, Year, Budget, GenreId, GenreName)
Actor (ActorId, NIC, Name, DateOfBirth, Gender, MovieId, Role)

In the relation Actor, MovieId is a foreign key into Movie.

(i) For the relation Actor, explain what is meant by saying that MovieId is a foreign key into Movie.

[2 Marks]

(ii) Using suitable examples, discuss potential problems the above database might suffer due to data redundancy.

[6 Marks]

(iii) Normalize the above database into 3rd Normal Form. Clearly explain the normalization steps.

[10 Marks]

Continued...

(b) Suppose that there is a relational database with the following relations (Primary keys are underlined).

Customer (CustomerNo, CName, Gender, Address)
Account (AccountNo, CustNo, AccountType, Balance)

In the relation Account, CustNo is a foreign key into Customer.

(i) Write a SQL query that will get the names of the customers having accounts with a balance more than Rs. 100, 000/=.

[3 Marks]

(ii) Write a SQL query that will get total balances available for each account type. Note: There are various account types as Child Saving, Youth Saving, Fixed Deposit, etc.

[4 Marks]

Question 4 *[25 Marks]*

(a) What is DCL?

[2 Marks]

(b) Consider the relation below (Primary key is underlined).

Customer (CustomerNo, CName, Gender, DateOfBirth, Salary, Comment)

(i) Write SQL statement to create the Customer table. Identify suitable data types for each attribute.

[5 Marks]

(ii) Write SQL statement to add a record to Customer table.

[4 Marks]

(c) Explain spanned records and unspanned records using values given below.

No. of Records = 4, Record size = 4 Mb, Block size = 10 Mb

[4 Marks]

(d) List the steps of inserting a record to a Heap file.

[4 Marks]

(e) Using a suitable example, explain following SQL syntax when setting a foreign key.

ON DELETE SET NULL ON UPDATE CASCADE

[6 Marks]

END OF PAPER.