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RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. General Degree in Applied Sciences
First Year Semester I Examination –October/November 2014

COM 1302- Database Management Systems

Answer **All** questions Time: Three Hours

01.

I. Why would you choose a database system instead of simply storing data in operating system files? (3 Marks)

II. Explain the difference between external, internal, and conceptual schemas. How are these different schema layers related to the concepts of logical and physical data independence? (4 Marks)

III. What are the responsibilities of a Database Administrator? (3 Marks)

IV. What is the difference between two-tier and three-tier client/server architectures? (2 Marks)

V. Define following terms.

a) Data Model
b) Database Schema
c) Meta data
d) Query Language

(2*4 Marks)

02.

I. 'Notown Record Musics' has decided to store information about musicians who perform on its albums as well as other company data in a database. The company has chosen to hire you as a database designer. Design a conceptual schema for I. 'Notown Record Musics' and draw an ER diagram for your schema. Be sure to indicate all key and cardinality constraints and any assumptions you make.

a) Each musician that records at Notown has an SSN, a name, an address, and a phone number. They may have more than one phone number.

b) Each instrument used in songs recorded at Notown has a name (e.g., guitar, synthesizer, and flute) and a musical key (e.g., C, B-flat, E-flat).

c) Each album recorded on the Notown label has a title, a copyright date, a format (e.g., CD or MC), and an album identifier.

d) Each song recorded at Notown has a title and an author.

e) Each musician may play several instruments, and a given instrument may be played by several musicians.

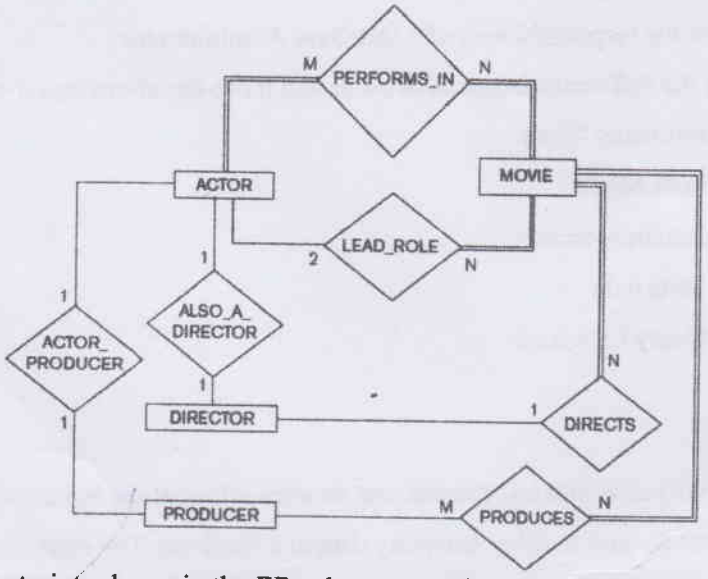
f) Each album has a number of songs on it, but no song may appear on more than one album.

g) Each song is performed by one or more musicians, and a musician may perform a number of songs.

h) Each album has exactly one musician who acts as its producer. A musician may produce several albums.

(12 Marks)

II. Consider the ER schema for the MOVIES database. Assume that MOVIES is a populated database. ACTOR is used as a generic term and includes both actor and actresses.



Given the constraints shown in the ER schema, mention whether the following statements True, False, or Maybe. Assign a response of Maybe to statements that, while not explicitly shown to be True, cannot be proven False based on the schema as shown. Justify each answer.

a) There are no actors in this database that have been in no movies

b) Every director has been an actor in some movie.

c) There are movies with more than twelve actors.

d) There are some actors who have done a lead role, directed a movie, and produced some movie.

(2*4 Marks)

03.

I. Define the following terms:

a) relation schema

b) domain

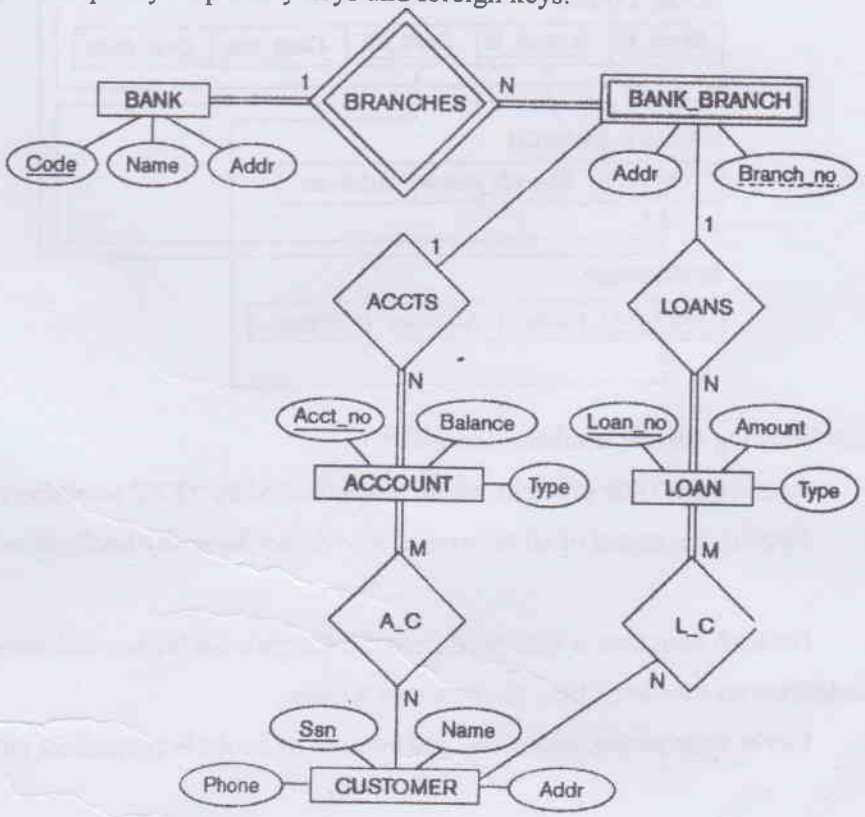
c) relation cardinality

d) relation degree

(2*4 Marks)

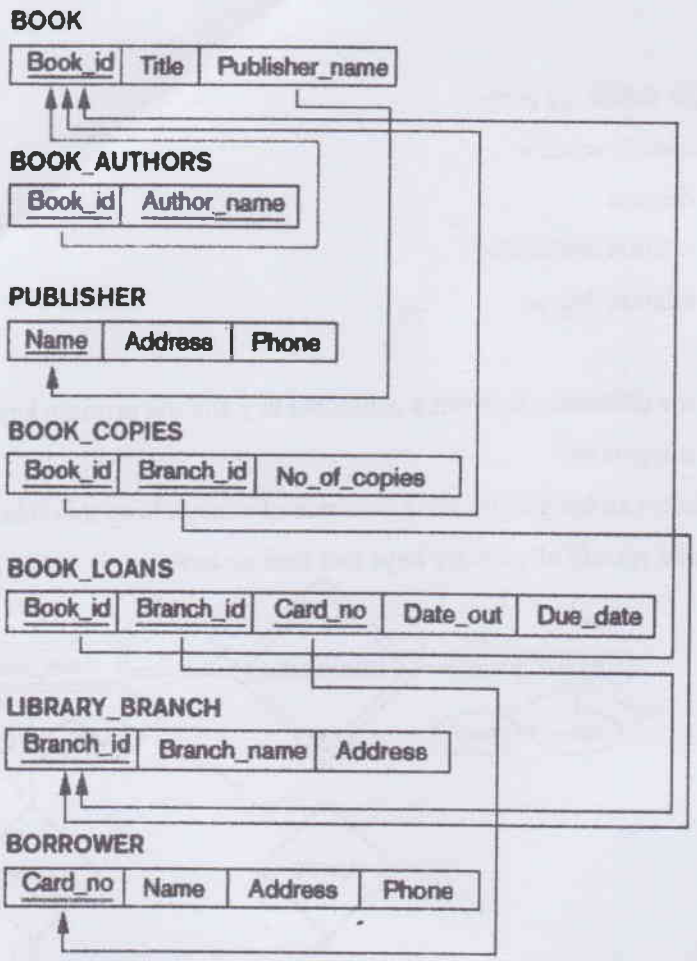
II. What is the difference between a candidate key and the primary key for a given relation? What is a superkey? (4 Marks)

III. Figure shows an ER schema for a database of a bank. Map this schema into a relational schema and specify all primary keys and foreign keys.



(8 Marks)

04. Consider the LIBRARY relational database schema shown below to answer "**Part I**" and "**Part II**".



I. Write following queries in relational algebra.

a) Retrieve the Tittle of books which are published by "XYZ publishers" (2 Marks)

b) Retrieve the names of all borrowers who do not have any books borrowed. (2 Marks)

c) For each book that is borrowed from the Sharpstown branch and whose Due_date is today, retrieve the book title, the borrower's name. (2 Marks)

d) Retrieve the names, addresses, and number of books borrowed for all borrowers. (2 Marks)

II. Write following queries in SQL

a) Write appropriate SQL DDL statements for declaring the LIBRARY relational database schema. (2 Marks)

b) Find the number of books written by "ABC Franklin". (2 Marks)

c) Retrieved the names of barrowers who have borrowed more than 5 books. (2 Marks)

d) For each library branch, retrieve the branch name and the total number of books loaned out from that branch. (2 Marks)

III. List the data types that are allowed for SQL attributes. (1 Mark)

IV. How does SQL allow implementation of the entity integrity and referential integrity constraints (3 Marks)

05.

I. Describe characteristics of a relation that is not in normalized form. (4 Marks)

II. Define Functional dependency. (2 Marks)

III. Define following terms using suitable examples

a) Full Dependency

b) Partial Dependency

c) Transitive Dependency (2*3 Marks)

IV. Consider following relation;

Patient Code	Patient Name	Medication Procedure	Charge. (Rs)
32968	Priyantha Perera	Check up	200
392718	Deepika Kalpage	Chemotherapy	450
419871	Nalin weerasinghe	Check up	200
32968	Priyantha Perera	X-Ray	250
32968	Priyantha Perera	Blood Report	380
32968	Priyantha Perera	Check up	200

a) Which normal form is this relation in? State reasons. (4 Marks)

b) Decompose above relation in to third normal form (3NF). Clearly show all dependencies based on given data in the table and state the reasons behind each decomposition. (4 Marks)