**53 (IT 402) DBMN**

**2014**

# DATABASE MANAGEMENT SYSTEM

**Paper : IT 402**

*Full Marks : 100*

Time : Three hours

***The figures in the margin indicate full marks for the questions.***

*Answer **any five** questions.*

1. *(a)* Explain the desirable properties of a transaction. 10

   *(b)* What is a schedule ? Define the concepts of recoverable, cascadeless, and strict schedules, and compare them in terms of their recoverability. 10

2. *(a)* Compare binary locks to exclusive / shared locks. Why is the later type of locks preferable ? 10

(b) Describe the wait-die and wound-wait protocols for deadlock prevention. 10

3. (a) What is data redundancy ? What are the disadvantages of having redundancy within a database ? How redundancy can be reduced ? 10

(b) Discuss the main categories of data model. 10

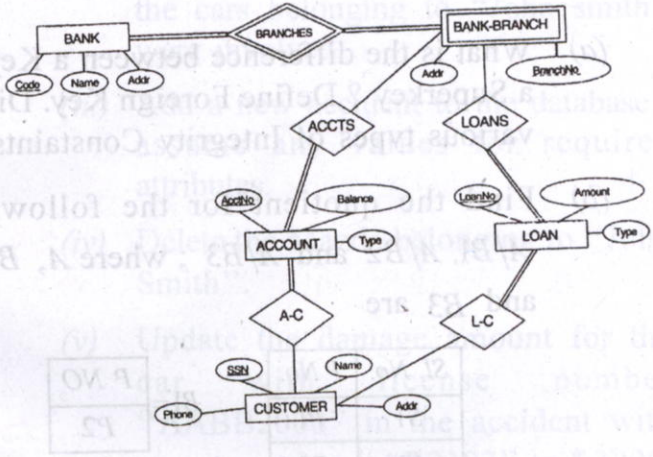
4. (a) What is participation role ? When is it necessary to use role names in the description of relationship types, explain with an example. 5

(b) Consider the ER diagram shown in the figure below for part of a Bank Database. Each bank can have multiple branches and each branch can have multiple accounts and loans. 6

(i) List the entity types in the ER diagram.

(ii) Is there a weak entity type ? If so, give its name, partial key, and identifying relationship.

(iii) What constraints do the partial key and identifying relationship of the weak entity type specify in this diagram ?




(c) What are the enhancements that distinguish EER model from ER model ? 9

5. (a) Discuss the purpose of Boyce-Codd normal form and describe how BCNF differs from and is stronger than 3*NF*. Illustrate your answer with an example. 10

(b) What is lossless join property of a decomposition ? Why is it important ? 5

(c) Given below are two sets of FDs for a relation $R(A,B,C,D,E)$. Are they equivalent ? 5

$$F = \{A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow B\}$$

$$G = \{A \rightarrow CD,\ E \rightarrow AB\}$$

6. (a) What is the difference between a Key and a Superkey ? Define Foreign Key. Discuss various types of Integrity Constaints. 10

(b) Find the quotient for the following : $A/B1$, $A/B2$ and $A/B3$ ; where $A$, $B1$, $B2$ and $B3$ are 10

$A =$

| Sl. No. | P No. |
|---|---|
| S1 | P1 |
| S1 | P2 |
| S1 | P3 |
| S1 | P4 |
| S2 | P1 |
| S2 | P2 |
| S3 | P2 |
| S4 | P2 |
| S4 | P4 |

$B1 =$

| P NO |
|---|
| P2 |

$B2 =$

| P NO |
|---|
| P2 |
| P4 |

$B3 =$

| P NO |
|---|
| P1 |
| P2 |
| P4 |

7. *(a)* Consider the Insurance database of figure below, where the primary keys are underlined. Construct the following SQL queries for this relational database. 10

*(i)* Find the total number of people who owned cars that were involved in accidents in 1989.

*(ii)* Find the number of accidents in which the cars belonging to "John smith" were involved.

*(iii)* Add a new accident to the database ; assume any values for required attributes.

*(iv)* Delete the Mazda belonging to "John Smith".

*(v)* Update the damage amount for the car with license number "AABB2000" in the accident with report number "AR2197" to $3000.

person (driver_id#, name, address)

car (license, model, year)

accident (report_number, date, location)

owns (driver_id#, license)

participated (driver_id, car, report_number, damage_amount)

(b) Explain how the GROUP BY clause works. What is the difference between HAVING and WHERE clause ? 10