

*Time allowed : 3 hours] [Maximum marks : 100*

*Note : Question No. 1 is compulsory. Attempt five questions in total selecting one question from each Section.*

1. (a) Differentiate between primary key, candidate key and super key.
- (b) How do TRC and DRC differ from each other ?
- (c) What do you mean by closure of a set of FDs ?
- (d) Explain the state diagram of transaction. 5×4

#### Section-A

2. (a) Construct an ER diagram for a car insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents. 15
- (b) Define the concept of aggregation. Also give two real world examples for this. 5

3. (a) List the significant differences between DBMS and file system. 10
- (b) What do you mean by data model ? Explain its various types. 10

#### Section-B

4. Construct a B+ tree for the following key values 20  
2, 3, 5, 7, 11, 17, 19, 23, 29, 31  
Assume that the tree is initially empty and the number of pointers that will fit in one node is four. Show the tree after each of the following operations insert 9, 10, 8 and then delete 23, 19.
5. Discuss the operations of relational algebra and the purpose of each. <http://www.HaryanaPapers.com>

#### Section-C

6. Consider the relational database  
Employee (name, street, city)  
Works (name, company-name, salary)

Company (company-name, city)

Managers (name, manager)

Give an expression in SQL for the following queries : 20

- (a) Find the names of all employees who work for first bank corporation
- (b) Find the names of all employees who live in the same city and street as do their managers.
- (c) Find the names and cities of residence of all employees who work for First Bank Corporation.
- (d) Find the name of all employees who do not work for First Bank Corporation.
- (e) Find the name of all employees who earn more than every employee of small bank corporation.
- (f) Modify the database so that Jones now lives in Newton.
- (g) Give all employee of first Bank Corporation a 10 percent raise.
- (h) Give all managers of First Bank Corporation a 10 percent raise.

- (i) Give all employee of first Bank Corporation a 10 percent raise unless the salary becomes greater than 100,000/- in such cases give only a 3 percent raise.
  - (j) Delete all tuples in works relation for employees of small bank corporation.
7. What do you mean by normalization ? Explain in detail 1NF, 2NF, 3NF, BCNF, 4NF, 5NF 20

#### Section-D

8. What do you mean by serializability ? How you will check for conflict serializability. Explain with a suitable example. 20
9. What is the two phase locking protocol ? How does it guarantee serializability ? 20

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