

Subject: DATABASE MANAGEMENT SYSTEMS

Time: 3 Hours

Max. Marks: 100

DECEMBER 2009

NOTE: There are 9 Questions in all.

- Question 1 is compulsory and carries 20 marks. Answer to Q. 1. must be written in the space provided for it in the answer book supplied and nowhere else.
- Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

Q.1 Choose the correct or the best alternative in the following: (2×10)

a. The various copies of the same data may no longer agree is called

- (A) Data inconsistency (B) Data redundancy
(C) Data isolation (D) Data abstraction

b. Declarative DMLs also referred to as

- (A) Procedure DMLs (B) Non procedural DMLs
(C) Query Language (D) DDL

c. _____ is a set of one or more attributes that, taken collectively allow us to identify uniquely a tuple in the relation.

- (A) Super key (B) Secondary key
(C) Candidate key (D) Foreign key

d. To remove a relation from a SQL database, we use the

- (A) Delete table (B) Alter table
(C) Update table (D) Drop table

e. A query in the tuple relational calculus is expressed as

- (A) $\{ P(t) \mid t \}$ (B) $\{ \langle x_1, x_2, \dots, x_n \rangle \mid P(x_1, x_2, \dots, x_n) \}$
(C) $\{ t \mid P(t) \}$ (D) $\{ t = P(t) \}$

f. _____ writes an updated buffer at a different location, to maintain multiple versions of data items.

- (A) Caching (B) Shadowing
(C) Buffering (D) Spooling

g. The process of designating sub groupings within an entity set is called

- (A) Specialization (B) Generalization
(C) Inheritance (D) Aggregation

h. _____ is the fastest and most costly form of storage.

- (A) Hard disk (B) RAM
(C) Cache (D) ROM

i. An index record appears for only some of the search key values is called

- (A) Dense index (B) Sparse index
(C) Hash index (D) Ordered index

j. A transaction that complete its execution successfully is said to be

- (A) Aborted (B) Active
(C) Failed (D) Committed

**Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.**

Q.2 a. What are the five main functions of database administrator? (6)

b. Differentiate schema and instance. (4)

c. How does 2 tier architecture differs from 3 tier architecture? (6)

Q.3 a. Explain the following terms: (6)

- (i) Entity integrity
(ii) Referential integrity
(iii) Foreign key

b. Let $R=(A,B,C)$ and let r_1 and r_2 both be relations on schema R . Give an expression in the domain relational calculus that is equivalent to each of the following:

- (i) $\Pi_A(r_1)$
(ii) $\sigma_{B=17}(r_1)$
(iii) $r_1 \cup r_2$
(iv) $r_1 - r_2$
(v) $\Pi_{A,B}(r_1) \bowtie \Pi_{B,C}(r_2)$ (10)

Q.4 a. Draw E-R diagram for car insurance company with a set of customer, each of whom owns a number of cars. Each car has a number of recorded accident associated with it. (8)

b. Give an example for the following SQL queries:

- (i) Join (ii) Any two aggregate functions
(iii) Update (iv) Order By (8)

Q.5 a. Suppose we decompose the schema $R=(A,B,C,D,E)$ into $R_1 = (A,B,C)$ and $R_2 = (A,D,E)$. Show that this decomposition is a lossless decomposition if the following set F of functional dependencies holds:

- $A \rightarrow BC$
 $CD \rightarrow E$
 $B \rightarrow D$
 $E \rightarrow A$ (8)

- b. Explain Third Normal Form (3NF) and Boyce-Codd Normal Form (BCNF). (8)
- Q.6** a. Write an algorithm to search for a record with search key field value K, using a B⁺- tree. (8)
- b. Explain various types of indexing structures for files. Give their applications. (8)
- Q.7** a. Explain desirable properties of transactions also known as ACID properties. (4)
- b. Give an example of serial and non-serial schedule involving any two transactions T₁ and T₂. (6)
- c. Describe various types of locks used in concurrency control. (6)
- Q.8** a. Define the following:
(i) Transaction rollback (ii) Cascading rollback (8)
- b. Explain the terms: steal and no-steal approach in standard DBMS recovery schemes. (8)
- Q.9** a. Define query optimization and explain its significance in DBMS. (8)
- b. Explain the algorithms for the following:-
(i) Project and set operations.
(ii) Outer Join. (8)