2014

Data Base Management Systems

Time Alloted : 3 Hours *Full Marks : 70*

The figure in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable

GROUP - A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following: 10x1=10

i) The set of permitted values for each attribute is called its
(a) attribute set (b) attribute range
(c) domain (d) group

ii) The operation on certain relation X, produces Y such that Y contains only selected attribute of X, such operation is
(a) projection (b) selection
(c) union (d) difference

iii) What is the cardinality of a table with 100 rows and 10 columns?
(a) 1000 (b) 100
(c) 10 (d) 10000

iv) An attribute of one table matching with the primary key of another table is called

(a) foreign key (b) secondary key
(c) candidate key (d) surrogate key

v) If two relations have 5 and 10 rows respectively, then no. of tuples in Cartesian product will be

(a) 50 (b) 5
(c) 10 (d) 15

vi) The primary key indexing techniques do not allow

(a) Sets of relations (b) Multiple attributes
(c) duplicate data (d) Many to many relation

vii) A candidate key which is not a primary key is known as

(a) super key (b) alternate key
(c) foreign key (d) non prime attribute

viii) Which one is not a traditional set operator defined on relational algebra?

(a) Union (b) Intersection
(c) Set Difference (d) Join

ix) Which operator performs pattern matching in SQL?

(a) Except (b) Intersect
(c) Join (d) Like

x) Association among several entities is known as

(a)attribututes (b) relationship
(c) field (d) none of these

xi) 2NF is based on _____ dependency

a) transitive b)total
c) partial d) functional

xii) If $X \supseteq Y$ *then* $X \rightarrow Y$ is an example of _____ dependency

a) partial b) join
c) non trivial d) trivial

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following. 3x5=15

2. Explain Relational Algebra using the operators {∂,∏,⋃,-,X and show that: A∩B = A ⋃ B – ((A-B)⋃(B – A))
3. Describe the three-level architecture of DBMS.
4. a) Explain the difference between external, internal and conceptual schemas.
   b) What is the highest NF of each of the following relations?
      i. R1(J, K, L) with FDs are J→K, J→ L, K → L
      ii. R2 (J, K, L, M) with FDs are J → KL, LM → K
5. Explain ACID properties of transactions.
6. "All primary keys are the super key but the converse is not true." Clarify.

GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. 3x15=45

7. i) Describe dense and sparse indices with diagram.

   ii) Define concept of aggregation. Give two examples where this concept is useful.

   8+ 7 =15

8. i) Describe the three tier architecture of the general DBMS.
   ii) Let R =(A, B) and S =(A, C) and let r (R) and r(S) be relations. Write relational algebra expression equivalent to the domain relational calculus expressions:
      a) {< a > | there exist b (<a, b> belongs to r^ b = 17}
      b) {<a, b, c > | <a, b> belongs to r^ <a,c> belongs to s}

   7+4+4 = 15

9. i) Why certain functional dependencies are called trivial functional dependencies?

ii) Use Armstrong's axioms to prove the soundness of the union rule.

iii) Compute the closure of the following set F of FDs for each relation schema

R = (A,B,C,D,E).
A->BC
CD->E
B ->D
E-> A.
List the candidate key for R. 7+4+4=15

10. i) Construct a B+ tree for the following set of values:
(2,3,5,7,11,17,19,23,29.31)
Assume that the tree is initially empty and values are added in ascending order. Contract B + tree for the cases where the number of pointers that will fit in one node is as follows
   a. Four
   b. Six
   c. Eight

ii) Consider the followings tables
employee (emp_name, street, city)
works (emp_name, company_name, salary)
company (company_name, city)
managers (emp_name, manager_name)
Give SQL, expression for the following queries
a.Find the names and cities of residence of all employees who work for First Bank Corporation.
b.Find the name, street address and cities of residencies of all employees who work for First Bank Corporation and earn more than Rs. 100000.
c.Find all employees in the database who earn more than each employee of Small Bank Corporation. 9 + 6 =15

11. Write short notes on any three topics 5x3=15

   a. Functional Dependency
   b. Indexing
   c. Mapping cardinalities
   d. Query processing and optimization
   e. Hashing

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