Code: 15A05301

R15

B.Tech II Year I Semester (R15) Supplementary Examinations June 2017

DATABASE MANAGEMENT SYSTEMS

(Common to CSE and IT)

Time: 3 hours   Max. Marks: 70

PART – A
(Compulsory Question)
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1   Answer the following: (10 X 02 = 20 Marks)
  (a)   How many distinct tuples are in a relation instance with cardinality 22?
  (b)   Define candidate key.
  (c)   Let R = (A, B, C), and let r_1 and r_2 both be relations on schema R. Give an expression in SQL that is equivalent to r_1 - r_2.
  (d)   Explain the statement that relational algebra operators can be composed. Why is the ability to compose operators important?
  (e)   Decompose the functional dependency $X \rightarrow YZ$.
  (f)   Consider a relation R(A, B, C, G, H, I) and functional dependences {$A \rightarrow B$, $A \rightarrow C$, $CG \rightarrow H$, $CG \rightarrow I$, $B \rightarrow H$}. Compute (AG)+.
  (g)   Suppose that there is a database system that never fails. Is a recovery manager required for this system?
  (h)   What benefit does strict two-phase locking provide?
  (i)   List the two kind of indices.
  (j)   B+ tree of order d has m entries in every node. What is the mathematical relation between d and m?

PART – B
(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 (a) Why would you choose a database system instead of simply storing data in operating system files? When would it make sense not to use a database system?
   (b) What are the responsibilities of a DBA? If we assume that the DBA is never interested in running his or her own queries, does the DBA still need to understand query optimization? Why?

OR

3   Consider the following information about a university database:
        Professors have an SSN, a name, an age, a rank and a research specialty. Projects have a project number, a sponsor name, a starting date, an ending date and a budget. Graduate students have an SSN, a name, an age and a degree program. Each project is managed by one professor. Each project is worked on by one or more professors. Professors can manage and/or work on multiple projects. Each project is worked on by one or more graduate students. When graduate students work on a project, a professor must supervise their work on the project. Graduate students can work on multiple projects, in which case they will have a supervisor for each one. Departments have a department number, a department name and a main office. Departments have a professor who runs the department. Professor's work in one or more departments.
        Design and draw an ER diagram that captures the information about the university.

UNIT – II

4   Consider the following schema:
        Suppliers(sid: integer, sname: string, address. string)
        Parts(pid.' integer, pname: string, color: string)
        Catalog(sid: integer, pid. integer, cost: real)
        Write the queries in relational algebra, tuple relational calculus, domain relational calculus and SQL to find the *sids* of suppliers who supply some red part and some green part.

OR

5   Consider the following relational schema and briefly answer the questions that follow:
        Emp(eid: integer, ename: string, age: integer, salary: real)
        Dept(did: integer, budget: real, managerid: integer)
  (a)   Define a table constraint on **Emp** that will ensure that every employee makes at least $10,000.
  (b)   Define a table constraint on **Dept** that will ensure that all managers have age > 30.

UNIT – III

6   Explain about following normal forms
   (a)   Second Normal Form.
   (b)   Third Normal Form.
   (c)   Boyce-Codd Normal Form.

OR

7   (a)   Write a short note about lossless join decomposition.
    (b)   Give a note on Dependency preservation.

UNIT – IV

8   Show that there are schedules that are possible under the two-phase locking protocol, but are not possible under the timestamp protocol, and vice versa.

OR

9   (a)   List the ACID properties. Explain the usefulness of each
    (b)   Explain the difference between the three storage types-volatile, nonvolatile and stable in terms of I/O cost.

UNIT – V

10   Explain the difference between Hash index and B^+ tree index. In particular, discuss how equality and range searches work, using an example?

OR

11 (a)   What is the minimum space utilization for a B^+ tree and ISAM index?
    (b)   Explain why local depth and global depth are needed in Extendible Hashing.

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