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15CS53

Fifth Semester B.E. Degree Examination, June/July 2018
Database Management Systems

Time: 3 hrs.

Max. Marks: 80

Note: *Answer any FIVE full questions, choosing one full question from each module.*

Module-1

1 a. Discuss the main characteristics of the database approach and how it differs from traditional file systems. **(04 Marks)**

  b. Describe the three – schema architecture. Why do we need mappings among schema levels? **(04 Marks)**

  c. Discuss various components of a DBMS, with a neat diagram. **(08 Marks)**

OR

2 a. Define an Entity and Attribute. Explain the different types of attributes that occur in an ER – diagram model, with an example. **(06 Marks)**

  b. Draw an ER – diagram of an Airline reservation system, taking into account at least five entities. Indicate all keys, constraints and assumptions that are made. **(10 Marks)**

Module-2

3 a. Explain the data types available for attribute specification in SQL. **(04 Marks)**

  b. Explain briefly violations in entity integrity constraint, key and referential integrity constraints, with example. **(06 Marks)**

  c. Consider the following RESORT database,
  RESORT (resortno, resortname, resorttype, resortaddr, resortcity, numsuite)
  SUITE(suiteno, resortno, suiteprice)
  RESERVATION (reservationno, resortno, visitorno, checkin, checkout, totalvisitor, suiteno)
  VISITOR (visitorno, firstname, lastname, visitoraddr)
  i) Write the SQL to list full details of all the resorts on Los Angeles.
  ii) Write the SQL to list full details of all the resorts having number of suites more than 30.
  iii) Write the SQL to list visitors in ascending order by firstname. **(06 Marks)**

OR

4 a. Explain how constraints are specified in SQL during table creation, with suitable example. **(04 Marks)**

  b. Consider the following relations for a database that keeps track of student enrollment in courses and the books adopted for each course : **(06 Marks)**
  STUDENT (SSn, Name, Major, bdate)
  COURSE (Courseno, Cname, dept)
  ENROLL (SSn, Courseno, Quarter, grade)
  BOOK_ADOPTION (Courseno, Quarter, book_isbn)
  TEXT (book_isbn, book_title, Publisher, Author)
  Write the following queries in relational algebra on the database schema :
  i) List the number of courses taken by all students named John Smith in winter 2009 (i.e. Quarter = WO9).
  ii) Produce a list of text books (include courseno, book_isbn, book_title) for courses offered by the 'CS' department that have used more than two books.
  iii) List any department that has all its adopted books published by 'Pearson' publishing.

  c. Give an example of mapping of generalization or specialization into relation schemas. **(06 Marks)**

Module-3

5 a. Discuss how each of the following constructs is used in SQL and discuss the various options for each construct : **(06 Marks)**
   i) Nested Queries   ii) Aggregate functions   iii) Triggers   iv) Views and their updatability   v) Schema change statements   vi) Group by and having clause.

   b. Draw and explain 3 – tier Architecture and technology relevant to each tier. Write the advantages of 3 – tier architecture. **(06 Marks)**

   c. What is CGI? Why was CGI introduced? What are the disadvantages of an architecture using CGI scripts? **(04 Marks)**

OR

6 a. What is Dynamic SQL and how is it different from Embedded SQL? **(04 Marks)**

   b. What is SQL J and how is it different from JDBC? **(04 Marks)**

   c. Consider the following company database :
   EMP (Name, Ssn , Salary, Superssn, dno)
   DEPT (dnum, dname, mgrssn)
   DEPT_LOC (dnum, dlocation)
   PROJECT (Pname, Pnumber, Plocation, dnum)
   WORKS_ON (Essn, Pno, Hours)
   DEPENDENT (Essn, dept_name, sex)
   Write SQL queries for the following :
   i) Retrieve the names of all employees who work in the department that has the employee with the highest salary among all employees.
   ii) Retrieve the names of employees who make atleast 10,000 more than the employee who is paid the least in the company.
   iii) A view that has the employee name, supervisor name and employee salary for each employee who works in the 'Research' department.
   iv) A view that has the project name, controlling department name, number of employees and total hours worked per week on the project for each project with more than one employee working on it. **(08 Marks)**

Module-4

7 a. Discuss insertion, deletion and modification anomalies. Why are they considered bad? Illustrate with examples. **(04 Marks)**

   b. Define Multivalued dependency. Explain fourth normal form, with an example. **(06 Marks)**

   c. Consider the Universal relation R = {A, B, C, D, E, F, G, H, I, J} and the set of functional dependencies F = {{A, B}→ {C}, {A}→ {D, E}, {B}→ {F} ,{F}→ {G, H},{D}→{I, J}}. What is key of R? Decompose R into 2NF and then 3NF relations. **(06 Marks)**

OR

8 a. Define Non – additive join property of a decomposition and write an algorithm of testing for non – additive join property. **(04 Marks)**

   b. A relation R(A, C, D, E, H) satisfies the following FDs : A→C, AC → D , E → AD , E → H Find the Canonical cover for this set of FD's. **(06 Marks)**

   c. Consider two set of functional dependencies :
   F = {A → C, AC → D , E → AD , E → H} and G = {A → CD , E → AH} .
   Are they equivalent? **(06 Marks)**
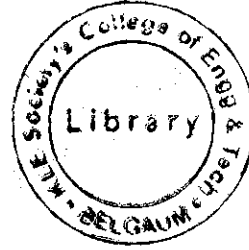
Module-5

9 a. Discuss ACID properties of a database transaction.   **(04 Marks)**

    b. Explain transaction support in SQL.   **(06 Marks)**

    c. Discuss the UNDO and REDO operations and the recovery techniques that use each.

        (06 Marks)

OR

10 a. What is two – phase locking protocol? How does it guarantee serializability?   **(04 Marks)**

    b. What is Serializability? How can serializability be ensured? Do you need to restrict concurrent execution of transaction to ensure serializability? Justify your answer.

        (06 Marks)

    c. Discuss the time – stamp ordering protocol for concurrency control.   **(06 Marks)**

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