CBCS SCHEME

Fifth Semester B.E. Degree Examination, Feb./Mar. 2022
Database Management System

Time: 3 hrs.   Max. Marks: 100

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

Module-1

1   a. List and discuss advantages of Database Management System over File Processing System. **(06 Marks)**
    b. Explain three Schema Architecture and reason for need of mapping among schema level. **(08 Marks)**
    c. Explain different types of attributes that occur in an E – R diagram model with example. **(06 Marks)**

OR

2   a. Explain characteristics of the Database approach. **(06 Marks)**
    b. Discuss the different types of User friendly interfaces. **(06 Marks)**
    c. Draw an ER diagram for an AIRLINES database schema with atleast five entities. Also specify primary key and structural constraints. **(08 Marks)**

Module-2

3   a. What are the basic operations that can change the states of relations in the database? Explain how the basic operations deal with constraints violations. **(06 Marks)**
    b. Explain the terms Super key , Candidate key and Primary key. **(04 Marks)**
    c. Given the following schema :
        emp (fname, Lname , SSN , Bdate, address, gender , salary , superSSN , Dno)
        dept (Dname , Dnumber , MgrSSN , mgrstartdate)
        dept_loc (Dnumber , Dloc)
        project (Pname, Pnumber, Ploc, Dnum)
        works_on (ESSN, Pno , hours)
        Dependent (ESSN , dependent _ name, gender , bdate , relationship)
        Give the relation algebra expression for the following :
        i)   Retrieve the name of the manager of each department.
        ii) For each project retrieve the project number , project name and number of employee who worked on that project.
        iii) Retrieve the names of employees who work on all the project controlled by department 5.
        iv) Retrieve the name of employees who have no dependents.
        v)   Retrieve number of Male and Female employee working in the Company. **(10 Marks)**

OR

4   a. Describe the steps of an algorithm for ER to Rational mapping with example. **(06 Marks)**
    b. Write command that is used for table creation. Explain how constraints are specified in SQL during table creation, with suitable example. **(04 Marks)**

c. Given the following schema
Emp (Fname, Lname , SSN , bdate , address, gender, salary , superSSN , dno)
dept (dname , dnumber, mgrSSN , mgrstartdate)
dept_loc (dnumber, dloc)
project (Pname, Pnumber, Ploc , dnum)
works_on (ESSN, Pno, hours)
dependent (ESSN , dependent_name, gender, bdate, relationship)
Give the relation algebra expression for the following :
  i)   Retrieve the name and address of all employees who work for 'sports' department.
  ii)   Retrieve each department number, number of employers and their average salary.
  iii) List the project number, controlling department number and department manager's last name , address and birthdate.
  iv)   Retrieve the name of employees with 2 or more dependents.
  v)   List female employees from dno = 20 earning more than 50000. (10 Marks)

Module-3

5 a. Define Database stored procedure. Explain creating and calling stored procedure with example. (06 Marks)
   b. What is SQLJ and how is it different from JDBC? (06 Marks)
   c. Consider the following schema :
      Sailors (Sid , Sname , rating , age)
      Boats (bid, bname, color)
      Reservers (Sid , bid , day)
      Write queries in SQL
      i)   Find the ages of sailors whose name begins and ends with A and has atleast three characters.
      ii) Find the age of the youngest sailor who is eligible to vote (i.e. is atleast 18 years old) for each rating level with atleast two such sailors.
      iii) Find the names of sailors who have not reserved a red boat. (use nested query).
      iv) Compute increments for the rating of persons who have sailed two different boats on the same day. (08 Marks)

OR

6 a. What is CGI? Why was CGI introduced? What are the disadvantages of an architecture using CGI script? (06 Marks)
   b. What is Dynamic SQL and how is it different from embedded SQL? Explain. (06 Marks)
   c. Consider the following schema :
      Sailors (Sid, Sname, rating , age)
      Boats (bid, bname, color)
      Reserves (Sid, bid, day).
      Write queries in SQL.

      i)   Find the names of sailors who have reserved at least one boat.
      ii) Find sailors whose rating is better than some sailors called 'Jennifer'. (Use nested query)
      iii) Find the average age of sailor for each rating level that at least two sailors.
      iv) Find the name and age of the oldest sailor. (08 Marks)

Module-4

7 a. Which normal form is based on 6 transitive functional dependencies and full functional dependency? Explain the same with example. (08 Marks)

b. A relation R satisfies the following : FDS : $A \to C$, $AC \to D$, $E \to AD$, $E \to H$. Find the cover for this set of FDS. **(06 Marks)**

c. Consider the universal relation : $R = \{A, B, C, D, E, F, G, H, I, J\}$ and the set of functional dependencies. $F = \{AB \to C , A \to DE , B \to F , F \to GH , D \to IJ\}$.
Determine whether each decomposition has the loss less join property with respect to F.
$D_1 = \{R_1, R_2, R_3\}$; $R_1 = \{A, B, C, D, E\}$; $R_2 = \{B, F, G, H\}$; $R_3 = \{D, I, J\}$. **(06 Marks)**

OR

8 a. Write an algorithm to check whether decomposed relations are in 3NF with dependency preservation and non – additive join property. Consider universal relation $R = (U, C, L, A)$ and the set of functional dependencies. $F = \{P \to LCA, LC \to AP , A \to C\}$. Decompose the relation R into 3NF with dependency preservation and non – additive join property. **(06 Marks)**

b. Define Normal Form. Explain 1NF, 2NF and 3NF with suitable examples for each. **(08 Marks)**

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

Module-5

9 a. What are the anomalies occur due to interleave execution? Explain them with example. **(08 Marks)**

b. Explain different types of locks used in concurrency control. **(06 Marks)**

c. Explain how shadow paging helps to recover from transaction failure. **(06 Marks)**

OR

10 a. Explain ACID property of transaction and system log. **(06 Marks)**

b. When deadlock and starvation problem occurs? Explain how these problems can be resolved. **(06 Marks)**

c. Explain ARIES recovery algorithm with example. **(08 Marks)**

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