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18CS53

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)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

- 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 :
- Retrieve the name and address of all employees who work for 'sports' department.
 - Retrieve each department number, number of employees and their average salary.
 - List the project number, controlling department number and department manager's last name, address and birthdate.
 - Retrieve the name of employees with 2 or more dependents.
 - 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
- Find the ages of sailors whose name begins and ends with A and has atleast three characters.
 - 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.
 - Find the names of sailors who have not reserved a red boat. (use nested query).
 - 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.
- Find the names of sailors who have reserved at least one boat.
 - Find sailors whose rating is better than some sailors called 'Jennifer'. (Use nested query)
 - Find the average age of sailor for each rating level that at least two sailors.
 - 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 : $A \rightarrow C$, $AC \rightarrow D$, $E \rightarrow AD$, $E \rightarrow H$.
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. $F = \{AB \rightarrow C, A \rightarrow DE, B \rightarrow F, F \rightarrow GH, D \rightarrow IJ\}$.
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. $F = \{P \rightarrow LCA, LC \rightarrow AP, A \rightarrow C\}$. 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 $F = \{A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H\}$ and $G = \{A \rightarrow CD, E \rightarrow AH\}$. 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)
