Sr. No. 004502

December 2022

B.Tech. (CSE/CE/IT)- V SEMESTER

Database Management Systems (PCC-CS-501)

Time: 3 Hours

Max. Marks:75

Instructions:
1. *It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.*
2. *Answer any four questions from Part -B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*
4. *Assume the data and values, wherever required*

PART -A

Q1 (a) What are the characteristics of Database approach over the traditional File processing approach? (1.5)

(b) Explain the concept of DDL, DML and DCL? (1.5)

(c) Define the following: Super key, Primary key, Foreign key (1.5)

(d) What is the difference between Authentication and Authorization? (1.5)

(e) Write an efficient algorithm to calculate closure of a set of attributes. (1.5)

(f) Why Armstrong's axioms are considered sound and complete? (1.5)

(g) What do you mean by a Data Warehouse? (1.5)

(h) What are the ACID properties of transaction? (1.5)

(i) What are checkpoints? How they are helpful in database recovery? (1.5)

(j) Why deferred update technique of recovery is called NO-UNDO/REDO method? (1.5)

PART -B

Q2 (a) Compare and contrast the basic features of Relational, Hierarchical and Network data models with the help of a suitable example. (10)

(b) Elaborate in depth the components of DBMS with the help of a neat diagram. (5)

Q3 (a) Consider a relation (5)

CAR_SALE (Car#, Salesman#, Date_sold, Commission%, Discount_amt)

with (Car#, Salesman#) as primary key. Functional dependencies are:

{Car#, Salesman#}→ { Date_sold, Commission%, Discount_amt }

Date_sold→ Discount_amt

Salesman# → Commission%

Based on the given primary key, is this relation in 1NF, 2NF or 3NF? Why or why not? How would you successively normalize it completely? (5)

(b) What is the difference between 4NF and 5NF? Take suitable examples. (5)

(c) Who is DBA? What are the responsibilities of DBA? (10)

Q4 (a) Consider the following schema for a UNIVERSITY:

Student (name, rollno, class, department)
Course (course-name, course-number, credit-hrs, deptt)
Section (sec-id, course-no, semester, year, instructor)
Grade_report (rollnum, section-id, grade)

Specify the following queries in Relational Algebra:

(i) Retrieve the names of all courses taught by 'Prof XYZ' in 1998 and 1999.
(ii) Retrieve the names and departments of all grade 'A' students.
(iii) Retrieve the names and departments of all students who have either grade 'A' or are enrolled in a course with number 101.
(iv) Retrieve the names and roll no's of all those students who don't have grade 'B' in any of their courses.
(v) Generate a report showing Grade and the number of students obtaining that grade.

(b) Explain cardinality constraints and participation constraints applicable in ER Modeling. (5)

Q5 (a) What are various ways to assign timestamps to transactions? Explain time-stamp based concurrency control mechanism with suitable example. (10)

(b) What do you mean by a deadlock? Explain Wait-Die and Wound-Wait schemes of deadlock prevention. (5)

Q6 (a) What are distributed databases? How data is stored in these databases? (8)

(b) Explain various steps of KDD process. How Data Mining differs from KDD? (7)

Q7 Explain in brief the following: (15)

(a) SQL Injection
(b) B-Trees
(c) Query Optimization

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