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Question Paper Code: 54805

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

Fourth Semester

Information Technology

15UIT405 - DATABASE MANAGEMENT SYSTEMS

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. Which of the following statement is true? CO1- R
(i) Internal schema describes the physical storage structures of the database.
(ii) Conceptual schema describes the parts of the database that a particular user group is interested.
(iii) External schema describes the structure of the whole database.
(a) (i) only (b) (ii) only (c) (i) and (ii) (d) (ii) and (iii)
2. Which is an unary operation in relational algebra? CO2- R
(a) Selection Operation (b) Primitive Operation
(c) Projection Operation (d) Generalized selection operation
3. Which forms has a relation that possesses data about an individual entity? CO3- R
(a) 2NF (b) 3NF (c) 4NF (d) 5NF
4. _____ lock is acquired on a data item to perform a write operation. CO4- R
(a) Share (b) Binary (c) Write (d) Exclusive
5. Which type of file is easiest to update or modify? CO5- R
(a) Sequential (b) Hashed (c) Indexed (d) Clustered

PART – B (5 x 3= 15 Marks)

6. Describe the entity integrity and referential integrity constraints with suitable example. CO1- R
7. How does the domain relational calculus differ from tuple relational calculus? CO2- R
8. Find the highest normal form of a relation R(A,B,C,D,E) with Functional Dependency set as {BC->D, AC->BE, B->E} CO3- R
9. Discuss about recovery isolation levels. CO4- R
10. Recall the purpose and types of DBMS indexing techniques. CO5- R

PART – C (5 x 16= 80 Marks)

11. (a) (i) What are data models? Discuss the different levels of abstraction in a DBMS system with relevant example? CO1- U (8)
- (ii) Explain the role and functions of the database users and DBA. CO1- U (8)

Or

- (b) List out and explain the various symbols and concepts involved in E-R model. Construct an E-R diagram for a company which is organized into two departments. Each department has Employee working in it. Each department controls a number of projects. An Employee can work in two (or) more projects on a day. However, an employee is not permitted to work more than once on a project he/she worked on a day. (For example: if an employee has worked on project 'robo' on 10/03/2019, he/she will not be permitted to work again on the project 'robo' on 10/03/2019). The date of an employee worked, in-time and out-time to be kept-track. CO1- App (16)
12. (a) (i) Discuss the relational algebra operations supported in SQL and write the equivalent SQL statement for each operation. CO2- U (8)
 - (ii) What are the various aggregate operators does the SQL support? Give a suitable example for each aggregate operator. CO2- U (8)

Or

- (b) For the given schema, CO2- App (16)
Student(Name, Studentnumber, Class, Major)
Course(CourseName, CourseNumber, Credit Hours, Department)
Section(Sectionidentifier, coursenumbers, Semester, Year, Instructor)
Grade_report(studentNumber, SectionIdentifier, Grade)
Prerequisite(CourseNumber, Prerequisite Number)

Write the SQL queries to perform the following tasks:

- (a) Create table query for Course and Section relations using suitable data type for attributes and specify constraints.
- (b) Delete the record for student whose name is 'GEETA' and whose student number is 17.
- (c) For each section taught by Prof. Jain., retrieve the course number, semester, year and number of students who took the section.
- (d) Select the names of all the students in ascending order with the Grade 'O' and majoring in 'CS'
- (e) Update the class of student 'Sham' with the major 'BT' to 'BT2'
- (f) Create a view with the fields CourseName, CourseNumber, Credit Hours and Department that have Prerequisite.
13. (a) (i) State the goal of decomposition/normalization? Explain the 1NF, 2NF and 3NF with simple example? CO3- U (8)
- (ii) Normalize the relation R(name, address, gender, rank, salary) to 3rd normal form, ensuring that the resulting relations are dependency-preserving and lossless-join decompositions. Specify the primary keys in the normalized relations by underlining them. CO3- App (8)
- Or
- (b) Define functional dependency and explain the role of functional dependency in the process of normalization. CO3- App (16)
 Given the relation schema R = (A, B, C, D, E) and the canonical cover of its set of functional dependencies $F_c = \{ A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A \}$ Compute a lossless join decomposition in Boyce-Codd Normal Form for R.

14. (a) Draw the transaction state in DBMS. Explain the ACID properties and the role of COMMIT, ROLLBACK and SAVEPOINT, the SQL statements in transaction management with suitable example. CO4- U (16)

Or

- (b) Show that the two-phase locking protocol ensures conflict serializability and the transactions can be serialized according to their lock points. CO4- U (16)

15. (a) Explain the concept of block level striping as applied to RAID and illustrate in detail about different levels of RAID adopted in performance improvement of disk operation. CO5- U (16)

Or

- (b) (i) Demonstrate the steps involved in query processing and how would you estimate the cost of the query using suitable measures and catalog information. CO5- U (8)

- (ii) Compare static hashing and dynamic hashing techniques to ease the search of huge database structure. CO5- U (8)