

**DEPARTMENT: COMPUTER SCIENCE**

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| *Internal Assessment* | **II** | *Academic Year/Semester* | **2022-23 /IV** |
| *Subject* | **CST204-Database Management**  **Systems** | *Branch* | CSE/AI |
| *Date of Exam* | **14/06/2023** | *Duration* | **120 Min** |
| *Starting time* | **2:00 am/4:00 pm** | *Max. Marks* | **60** |

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| **PART-A (*Answer all questions, each carries 3 marks*) Max Marks: 12** | | | | |
| ***Q.No*** |  | ***Marks*** | ***CO*** | ***Level*** |
| **1** | What are the primary operations supported by DML in DBMS? Provide suitable examples. Explain with suitable diagrams. | 3 | IV | L2 |
| **2** | How is the purpose of **where** clause is different from that of **having** clause ? | 3 | IV | L2 |
| **3** | Illustrate different anomalies in designing a database schema. | 3 | IV | L2 |
| **4** | How are Views created and modified in RDBMS, Explain with proper SQL commands. | 3 | IV | L2 |

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| **PART-B (*Each question carries 12 marks)* Max Marks: 48** | | | | | | | |
| **5** | | a | | Illustrate correlated nested query in DBMS, and how does it differ from a non-correlated nested query? | 6 | IV | L2 |
| b | | Explain ASSERTIONS in DBMS, including their purpose. Provide an SQL command to create an assertion. | 6 | IV | L3 |
| **OR** | | | | | | | |
| **6** | | a | | Discuss the role of the GROUP BY clause in SQL and its impact on query results. | 4 | IV | L2 |
| b | | What are triggers in DBMS, and how can they be used to automatically update the 'Total' field when inserting records into the following schema: Student(id, name, subject1, subject2, subject3, Total) | 8 | IV | L3 |
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| **7** | | a | | Consider an EMPLOYEE file with 10000 records where each record is of size 80 bytes. The file is sorted on employee number (15 bytes long), which is the primary key. Assuming un-spanned organization and block size of 512 bytes compute the number of block accesses needed for selecting records based on employee number if,   * No index is used * Single level primary index is used * Multi-level primary index is used Assume a block pointer size of 6 bytes | 6 | IV | L3 |
| b | | Consider the following relations:  FACULTY(FNO, NAME, GENDER, AGE, SALARY, DNUM)  DEPARTMENT(DNO, DNAME, DPHONE)  COURSE(CNO, CNAME, CREDITS, ODNO)  TEACHING(FNO, CNO, SEMESTER)  DNUM is a foreign key that identifies the department to which a faculty belongs. ODNO is a foreign key identifying the department that offers a course.Write SQL expressions for the following queries:  (a) Names and department names of faculty members.  (b) Names of faculty members not offering any course.  (c) Names of departments offering more than three courses, in  alphabetic order. | 6 | IV | L3 |
| **OR** | | | | | | | |
| **8** | | a | | Suppose an ordered file with 30,000 records stored on a disk with block size 1024 bytes. File records are of fixed size with record length R = 100 bytes. Indexing Fields have ordering key field of the file is V = 9 bytes long, a block pointer is P = 6 bytes long. The first level index is supposed to be secondary Index and 2nd and 3rd level indexes are of Primary Index.   Find   * the blocking factor * number of blocks in each index levels * number of block access | 6 | IV | L3 |
| b | | For the relation schema below, give an expression in SQL for each of the queries that follows:  EMPLOYEE(employee-name, street, city)  WORKS(employee-name, company-name, salary)  COMPANY(company-name, city)  MANAGES(employee-name, manager-name)    a) Find the names, street address, and cities of residence for all employees who work for the Company ‘RIL Inc.' and earn more than $10,000.  b) Find the names of all employees who live in the same cities as the companies for which they work.  c) Find the names of all employees who do not work for ‘KYS Inc.’. Assume that all people work for exactly one company.  d) Find the names of all employees who earn more than every employee of ‘SB Corporation'. Assume that all people work for at most one company.  e) List out number of employees company-wise in the decreasing order of number of employees | 6 | IV | L3 |
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| **9** | | a | | Consider the set of keys {1, 2, 3, 4, 5, 6, 7, 8, 9, 10} and an order of 4. Please provide a step-by-step explanation for creating a **B+ Tree** using these keys. | 6 | IV | L3 |
| b | | Consider a **B-Tree** with Key size is of 10 bytes, block size is of 512 bytes, Record Pointer is of size 8 bytes and block pointer is of size 5 bytes. Find the order of B-Tree ? | 6 | IV | L3 |
| **OR** | | | | | | | |
| **10** | **a** | | Provide an explanation of GRID files, accompanied by a clear diagram, highlighting their advantages and disadvantages in data storage and retrieval? | | 6 | IV | L2 |
| **b** | | Demystify **Extendible hashing**, with a neat diagram illustrating its working, and explain how it handles collisions in the process? | | 6 | IV | L3 |
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| **11** | **a** | | What are the key principles or informal guidelines to follow when designing a database schema? Additionally, could you explain the potential consequences or impact of violating these guidelines? | | 6 | IV | L3 |
| **b** | | Define functional dependency, illustrate it with a relevant example, and explain the purpose or significance of functional dependency in database design? | | 6 | IV | L2 |
| **OR** | | | | | | | |
| **12** | **a** | | Provide an explanation of the **inference rules or axioms** used in Database Management Systems (DBMS), and discuss their role in deriving new relationships or dependencies from existing ones? | | 6 | IV | L3 |
| **b** | | Given two sets of functional dependencies,  E = {A→B, AB→C, D→AC, D→E} and F = {A→BC, D→AE}, can you determine whether E and F are equivalent or not? | | 6 | IV | L3 |

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| **Course Outcomes (CO):** |
| **CO V1 :** |
| **Bloom’s Taxonomy Level:** |
| L1: Remember, L2: Understand, L3:Apply L4:Analyze |