Code No: R1631054          R16          SET - 1

### III B. Tech I Semester Regular Examinations, October/November - 2018
## DATA BASE MANAGEMENT SYSTEMS
(Common to Computer Science Engineering, Information Technology)

Time: 3 hours                                                                      Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**
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## PART –A

| | | | |
|---|---|---|---|
| 1. | a) | Write the purpose of defining schema for an enterprise. | [2M] |
| | b) | Write the use of division operator in relational algebra. | [2M] |
| | c) | Write the differences between nested and correlated query. | [2M] |
| | d) | How dependency preservation can be achieved? | [3M] |
| | e) | Define durability and atomicity of a transaction. | [3M] |
| | f) | Write the significance of a clustered index. | [2M] |

## PART –B

| | | | |
|---|---|---|---|
| 2. | a) | Compare and contrast various Data Models. | [7M] |
| | b) | Demonstrate data abstraction implementation in DBMS. | [7M] |
| 3. | a) | Design a database for an airline. The database must keep track of customers and their reservations, flights and their status, seat assignments on individual flights, and the schedule and routing of future flights. Your design should include an E-R diagram, a set of relational schemas, and a list of constraints, including primary-key and foreign-key constraints. | [10M] |
| | b) | Discuss the representation of total participation and multivalued attribute in an E/R diagram. | [4M] |

4.  a)  Consider the SAILOR DATABASE                                           [10M]
Sailors (sid:string, sname:string, rating:integer, age:real)
Boats (bid:integer, bname:string, color:string)
Reserves (sid:integer, bid:integer, day:date)
Based on the above schema, write the corresponding SQL queries for the following?
i) Find the colors of boats reserved by Lubber.
ii) Find the names of sailors who have reserved at least one boat.
iii) Find the names of sailors who have reserved a red or green boat.
iv) Find the names of the sailors who have reserved both a Red boat and a Green boat.
v) Find names of sailors who have reserved all boats.

   b)  Write about the usability of 'group by' and 'having' clauses in SQL.          [4M]

5.  a)  Define functional dependency? How can you compute the minimal cover for a set of functional dependencies? Explain it with an example.          [7M]

   b)  Consider schema R = (A, B, C, G, H, I) and the set F of functional dependencies {A $\rightarrow$ B, A $\rightarrow$ C, CG $\rightarrow$ H, CG $\rightarrow$ I, B $\rightarrow$ H}. Compute the candidate keys of the schema. Compute the closure of the same.          [7M]

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6.  a)  Explain Wait/Die and Wound/Wait Schemes in transaction management.    [10M]
    b)  Write the properties of a transaction.    [4M]

7.  a)  What are the differences among primary, secondary and clustering indexes? How do    [7M]
        these differences affect the ways in which these indexes are implemented? Which of
        the indexes are dense and which are not?
    b)  Demonstrate the implementation of B+ trees.    [7M]

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## PART –A

| | | | |
|---|---|---|---|
| 1. | a) | Write the significance of data independence in DBMS design. | [2M] |
| | b) | List out the set operations specified in relational algebra? | [2M] |
| | c) | Write any two differences between Triggers and Integrity Constraints. | [2M] |
| | d) | What is lossless join? How it is achieved? | [3M] |
| | e) | Write the need of serializability in transaction management. | [3M] |
| | f) | Differentiate primary index from secondary index. | [2M] |

## PART –B

| | | | |
|---|---|---|---|
| 2. | a) | Explain the architecture of DBMS with a neat sketch. | [7M] |
| | b) | List out the functionalities of DBA. | [7M] |
| 3. | a) | Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examinations conducted. | [7M] |
| | b) | How do you represent cardinalities, roles, weak entities and weak relations in E/R diagram? Explain. | [7M] |
| 4. | a) | Consider the Bank Management System. | [10M] |

account(<u>account_number</u>, branch_name, balance)
branch (<u>branch_name</u>, branch_city, assets)
customer (<u>customer_name</u> customer_street, customer_city)
loan (<u>loan_number</u>, branch_name, amount)
depositor((customer_name, account_number)
borrower(customer_name, loan_number)
Based on the above schema, write the corresponding SQL queries for the following?
i) For all customers who have a loan from the bank, find their names, loan numbers, and loan amount.
ii) Find the customer names, loan numbers, and loan amounts, for all loans at the Perryridge branch.
iii) Find the names of all branches that have assets greater than those of at least one branch located in Brooklyn.
iv) Find the average account balance of those branches where the account balance is greater than Rs. 1200.
v) Find the maximum across all branches of the total balance at each branch.

| | | | |
|---|---|---|---|
| | b) | Explain any four SQL Aggregate operators with an example. | [4M] |

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5.  a)  Explain the problems related to decomposition.                                    [7M]
    b)  What is lossless join decomposition?  Explain the same with an example.           [7M]

6.  a)  Explain two phase locking for ensuring serializability.                           [9M]
    b)  Discuss about view serializability.                                               [5M]

7.  a)  Can we have at most one primary or clustering index on a file, but several        [5 M]
        secondary indexes? Justify
    b)  Demonstrate the implementation of B trees.                                        [9 M]

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## PART –A

| | | | |
|---|---|---|---|
| 1. | a) | Discuss the use of data model in DBMS. | [2M] |
| | b) | Write the differences between foreign, candidate and super keys. | [2M] |
| | c) | List out set operators can be used in SQL? | [2M] |
| | d) | Define multivalued dependency. | [3M] |
| | e) | List out types of logs available in transition management? Differentiate them. | [3M] |
| | f) | Why indexing is needed in DBMS? | [2M] |

## PART –B

| | | | |
|---|---|---|---|
| 2. | a) | Define data independence? How do you implement data independence in DBMS? Explain | [7M] |
| | b) | Differentiate File systems from DBMS. | [7M] |

| | | | |
|---|---|---|---|
| 3. | a) | Consider the Bank Management System. | [10M] |

account(account_number, branch_name, balance)
branch (branch_name, branch_city, assets)
customer (customer_name customer_street, customer_city)
loan (loan_number, branch_name, amount)
depositor((customer_name, account_number)
borrower(customer_name, loan_number)
Answer the following queries using relational algebra operators.
1. List all branch names and their assests
2. List all accounts of Brooklyn branch
3. List all loans with amount > 1000.
4. List all accounts of Perryridge branch with balance < 1000.
5. List Numbers of accounts with balances between 700 and 900

| | | | |
|---|---|---|---|
| | b) | Write the additional features of E/R Model. | [4M] |

| | | | |
|---|---|---|---|
| 4. | a) | Explain the operators in SQL with examples. <br> a)ANY b) IN c) EXISTS d) EXCEPT | [8M] |
| | b) | Explain nested queries and correlated queries with examples. | [6M] |

| | | | |
|---|---|---|---|
| 5. | a) | Explain BCNF and the properties of decompositions. | [9M] |
| | b) | Write the properties of functional dependencies. | [5M] |

| | | | |
|---|---|---|---|
| 6. | a) | What is a transaction? Write the properties of a transaction. | [3M] |
| | b) | Discuss the issues in handling concurrent transactions. | [4M] |
| | c) | Explain how Concurrency control can be achieved with locking methods. | [7M] |

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7. a) How does multilevel indexing improve the efficiency of searching an index file? [7M]
   b) Explain Hash-Based Indexing in detail. [7M]

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## PART –A

| | | | |
|---|---|---|---|
| 1. | a) | Differentiate DDL from DML. | [2M] |
| | b) | How does left outer join works? | [2M] |
| | c) | List out any four constrains applied during creation of the table. | [2M] |
| | d) | Write the importance of surrogate key. | [3M] |
| | e) | What is the purpose of a check point? When Rollback is used? | [3M] |
| | f) | Define clustered index. | [2M] |

## PART –B

2. a) Write any three data base applications with their functionalities.  [6M]
   b) Explain various data models in DBMS.  [8M]

3. a) Consider the following schema for company database  [10M]
   Employee (Name, ESSN, Salary, DNo, SuperSSN);
   Department(DName, DNos, MGRSSN);
   Project(PName, PNo, DNum);
   Works_ON(ESSN, PNo, Hours);
   Dependent(ESSN, DName, Sex);
   Write the queries in Relational Algebra
   i) List the name of employees with their dependants
   ii) Find the name of employees who work in department cse
   iii) Retrieve the name of managers, dept names with salaries.
   iv) Display the names of employees with their project names.
   v) Display the name of the employees with number of hours working.
   b) List out any four operations on relational algebra. Explain.  [4M]

4. a) Explain various types of Joins available in SQL with examples  [8M]
   b) Consider following relations and write SQL queries for given statements.  [6M]
   Assume suitable constrains.
   Instructor(ID, Name, Dept_name , Salary)
    Teaches(ID, Course_id, Sec_id, Semester(even/odd),Year)
   i) Find the average salary of the instructors in computer department.
   ii) Find the number of instructors in each department who teach a course in even
   semester of 2016.
   iii) Find the names of instructor with salary amounts between 30000 and 50000.

5. a) Explain FOURTH and THIRD normal forms with examples.  [7M]
   b) Elaborate the importance of computing closure of functional dependencies.  [7M]
   Explain the procedure with an example.

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| 6. | a) | Discuss about the implementation of atomicity and durability. | [7M] |
| | b) | Explain two phase locking protocol. | [7M] |
| 7. | a) | How does a B tree differ from a B+ tree? Why is a B+ tree usually preferred as an access structure to a data file? Explain. | [10M] |
| | b) | How does multilevel indexing improve the efficiency of searching an index file? | [4M] |

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