

## C6-R3: ADVANCED DATABASE MANAGEMENT SYSTEMS

### NOTE:

1. Answer question 1 and any FOUR questions from 2 to 7.
2. Parts of the same question should be answered together and in the same sequence.

Time: 3 Hours

Total Marks: 100

1.
  - a) What is an inclusion dependency? What is its relation with referential integrity? What difficulties may arise with reference to inclusion dependencies when going from 3NF to BCNF?
  - b) Compare RDBMS with ORDBMS and ORDBMS with OODBMS.
  - c) Discuss the problems caused by recursive queries with respect to negation.
  - d) How is it possible for a user to access more than one of the database systems using a single query? The databases may be distributive in nature.
  - e) Explain the use of compensating transactions in long duration transactions.
  - f) List types of spatial data and queries that commonly arise on them.
  - g) Summarize the CUBE and ROLLUP operations in SQL:1999.

**(7x4)**
  
2.
  - a) What are multivalued dependencies? Define and illustrate them using a suitable example.
  - b) Given relations  $r(A, B)$ , and  $s(A, C)$ . Express the following queries in Datalog.
    - i)  $\{ \langle a \rangle \mid \exists c ( \langle a, c \rangle \in s \wedge \exists b_1 ( \langle a, b_1 \rangle \in r \wedge \exists b_2 ( \langle a, b_2 \rangle \in r \wedge c > b_1 \wedge b_1 > b_2 ) ) ) \}$
    - ii)  $\pi_B( \sigma_{C \leq 5} ( r \bowtie s ) )$
  - c) Describe practical implementation of relational operators using iterator interfaces. What is pipelined execution?

**(6+6+6)**
  
3.
  - a) What is "pushing selections and projections" during query optimization? Explain with examples.
  - b) What is three-value logic? Explain its need and its implementation in SQL.
  - c) Write a note on datalog and deductive databases. Show the power of recursive queries using an example.

**(8+5+5)**
  
4.
  - a) How are deadlocks dealt with in a distributed system? Discuss the functionality of any one method in detail.
  - b) Explain the various types of equality semantics possible in an ORDBMS and the relationships between them.
  - c) What are the implications of storing large Abstract Data Type (ADT) and structure type objects in the database? How can such objects be indexed?

**(8+4+6)**

**5.**

- a) What is data partitioned parallel execution? How can we parallelize existing sequential operator evaluation code? Explain parallel sorting.
- b) Describe naming scheme for objects in a distributed database.
- c) Write a short note on nested transactions, multilevel transactions, transaction workflows and transaction monitors.

**(8+4+6)**

**6.**

- a) What is an active database? Write a note on triggers and their uses.
- b) If blocking facilitates efficient-storage and retrieval of records, why not store entire files in a one very large block?
- c) Explain the need for storing multimedia data in the database. Describe content based retrieval and its uses.

**(6+6+6)**

**7.**

- a) Describe with an example, how XML data can be stored in RDBMS.
- b) What are Top-N queries? How can they be executed more efficiently?
- c) How do you minimize the overlap between bounding boxes when node is split?

**(6+6+6)**