

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL (A constituent unit of MAHE, Manipal)

## I SEMESTER M.TECH. (CSE/CSIS)

### END SEMESTER MAKEUP EXAMINATIONS, DECEMBER 2018

### SUBJECT: ADVANCED DATABASE SYSTEMS [CSE 5102]

# **REVISED CREDIT SYSTEM**

### (24/12/2018)

Time: 3 Hours

MAX. MARKS: 50

#### Instructions to Candidates:

- ✤ Answer ALL the questions.
- ✤ Missing data may be suitable assumed.
- 1A. Explain two approaches to accessing SQL from a general-purpose programming language.
- **1B.** Write JAVA program that uses the JDBC interface.
- 1C. Let relations r<sub>1</sub>(A, B, C) and r<sub>2</sub>(C, D, E) have following properties: r<sub>1</sub> has 20,000 tuples, r<sub>2</sub> has 45,000 tuples, 25 tuples of r<sub>1</sub> fit on one block, and 30 tuples of r<sub>2</sub> fit on one block. Estimate in the worst case the number of block transfers and seeks required, using each of the following join strategies for r<sub>1</sub> ⋈ r<sub>2</sub>. (i) Nested-loop join (ii) Block nested-loop join
- 2A. Using the required equivalence rule write the equivalence of the following relational algebra expression.

 $\Pi_{name, title} (\sigma_{dept\_name} = "Music" \land year = 2009$  $(instructor \bowtie (teaches \bowtie \Pi_{course\_id, title}(course))))$ 

**2B.** Consider the following *flat\_books* relation in the Table 2B below: Table 2B

title	author	pub_name	pub_branch	keyword	
Compilers	Smith	McGraw-Hill	New York	parsing	
Compilers	Jones	McGraw-Hill	New York	parsing	
Compilers	Smith	McGraw-Hill	New York	analysis	
Compilers	Jones	McGraw-Hill	New York	analysis	
Networks	Jones	Oxford	London	Internet	
Networks	Frick	Oxford	London	Internet	
Networks	Jones	Oxford	London	Web	
Networks	Frick	Oxford	London	Web	

Write SQL query to nest the *flat\_books* relation on the attribute *keyword*. Also show result of this query.

**2C.** With neat diagram explain three basic steps in query processing.

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3A.	Write a parallel partitioned join algorithm to compute join of two relations r and s.	3
3B.	Define semijoin of $r_1$ with $r_2$ . Let $r_1$ be a relation with schema $R_1$ stores at site $S_1$ . Let $r_2$ be a relation with schema $R_2$ stores at site $S_2$ . Using semijoin strategy, evaluate the expression $r_1 \bowtie r_2$ and obtain the result at $S_1$ .	4
3C.	Write two-Phase commit protocol.	
<b>4A.</b>	Draw the galaxy schema diagram for the sales data of a company with respect to the four dimensions, namely time, item, branch and location. Schema diagram must have appropriate key and attributes for each dimensions.	4
<b>4B.</b>	Explain five OLAP operations.	3
4C.	Write short notes on XPath and XQuery	3
5A.	Write MapReduce algorithms for selection and projection operations.	4
5B.	With neat diagram explain graph model of NoSQL databases.	3
5C.	Explain CAP theorem.	3

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