

MANIPAL INSTITUTE OF TECHNOLOGY

Y LIFE A Constituent Institution of Manipal University

IV SEMESTER B.TECH. (COMPUTER SCIENCE AND ENGINEERING)

MAKE UP EXAMINATION JUNE 2017

SUBJECT: DATABASE SYSTEMS [CSE 2204]

REVISED CREDIT SYSTEM (21/06/2017)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ALL the questions.
- ✤ Missing data may be suitable assumed.
- **1A.** Explain the drawbacks of file systems with the required examples.
- **1B.** Consider the relational database as given below and give an expression in the relational algebra to express each of the following queries:
 - Person (name, age, gender)

Visits (<u>name, pizzeria</u>) - table contains the name of the person along with the place where the person eats pizza frequently.

Eats (<u>name, pizza</u>) – table contains the name of the person along with the pizza the person eats.

Serves (<u>pizzeria</u>, <u>pizza</u>, price) – table contains the name of the place and which pizza is served at what price.

i) Find the names of all females who eat both mushroom and pepperoni pizza.

ii) For each person, find all pizzas the person eats that are not served by any pizzeria the person visits. Return all such person (name) and pizza pairs.

iii) Find the names of all people who have visited every pizzeria which serves at least one pizza they eat.

iv) Find the pizzeria serving the cheapest pepperoni pizza. In the case of ties, return all of the cheapest-pepperoni pizzerias.

- **1C.** How does an aggregate function work? Mention the different types of aggregate functions.
- 2A. i) Assume a relation S having the attributes: C Class of a course, T Time for the class, R Room for the class, I Instructor of the class. Express the functional dependencies for the following constraints using the above attributes: a. No two instructors teach the same course.
 b. At any given time and in a given room, there is at most one class being taught there.
 - c. No class can be taught at one given time in two rooms.
 - d. No instructor can teach two classes at one given time.

ii) Let R= { ABCDEFGH } and F= { $CD \rightarrow AB, C \rightarrow D, D \rightarrow EH, AE \rightarrow C, A \rightarrow C, B \rightarrow D$ }. 2+2 Compute minimal cover of F.

- **2B.** Explain the third normal form. Give the 3NF Decomposition algorithm.
- 2C. Given a relation S(A,B,C,D,E) and functional dependencies for this relation schema : A->E, BC->A, DE->B. Find the possible candidate keys. Show the relation is in BCNF step by step considering only the functional dependency given in F.
- **3A.** In an organization there are many employees where each of them has a dependent. An **3+1**

3

1+1+1+1

3

1+2

3

employee has employee_id, name, address, date_of_joining, years_of_experience and skills as attributes. Dependent has dependent id, dependent_name, dob and relationship as attributes. The dependent id is the discriminant among the dependents of a single employee. i) Draw an ER diagram for the above database.

ii) An extension of the ER diagram is done in order to have the information of the project with its project id, project name and location. An employee needs to work on a project and there can be many employees working of different projects. Now where would you place the attribute of No_of_hours to record the number of hours spent by the employee on a particular project. Justify your answer.

- **3B.** How does checkpointing help in transactions? Explain the procedure of checkpointing during recovery.
- **3C.** For the given Figure 1, given below

$< T_0$ start> $< T_0 A 1000 950>$	< <i>T</i> ₀ start> < <i>T</i> ₂ <i>A</i> 1000 950>	$< T_0$ start> $< T_0$ A 1000 950>
$< T_0$, B, 2000, 2050>	$< T_0, B, 2000, 2050 >$	$< T_0, B, 2000, 2050$
	$< T_0$ commit>	$< T_0$ commit>
	$< T_1$ start>	$< T_1$ start>
	< <i>T</i> ₁ , <i>C</i> , 700, 600>	< <i>T</i> ₁ , <i>C</i> , 700, 600>
		$< T_1$ commit>
(a)	(b)	(c)
	Figure 1	

Considering the above snapshot of the log at three different instances of time. List out the recovery actions for each of the case above with respect to immediate DB modification recovery.

- **4A.** Mention the different ways of organizing the records in a file. Explain recoverable schedule and cascadeless schedule.
- 4B. i)Give a B+tree for the following set of key values: a, b, e, h, k, n, s, p, l, m, q. with n=4.
 ii) Construct the extendable hash structure for this file if the hash function is h(x) = x mod 7 and each bucket can hold three records. Given search key values are: 2, 3, 5, 7, 11, 17, 19, 23, 29, 31.
- **4C.** Explain with examples the index update done in Dense and Sparse indices during insertion and deletion.
- **5A.** Consider the relational database as given below and give an expression in SQL to express each of the following queries:

Salesman(salesman_id, name, city, commission)

Orders(<u>ord_no</u>, purchase_amt, ord_date, customer_id, salesman_id)

Customer(<u>customer_id</u>, cust_name, city, grade, salesman_id)

i)Display the order number followed by order date and the purchase amount for each order which will be delivered by the salesman whose name is 'Erik. (Use Set membership operator) ii)Find those customers with their name and those salesmen with their name and city who lives in the same city.

iii) Count the customers who have grades above the average grade of the customers in New York.

- 5B. How is 'with clause' useful? Consider a database having the following tables: account(account_number, branch_name, balance) branch(branch_name, branch_city, assests). to find all branches where the total account deposit is greater than the average of the total account deposits at all branches using with clause.
- 5C. What is a scalar subquery? Give queries which makes use of scalar subquery in a i) select clause and ii) from clause.

1+2

3

1 + 1

2+3

3

2+1+2

3