



Continuous Assessment Test (CAT) – II - APR 2024

Programme	:	B.Tech. CSE and its specialization	Semester	:	Winter 2023-24
Course Code & Course Title	:	BCSE302L / Database Systems	Slot	:	D2+TD2
Faculty	:	Dr. Appalaraju Muralidhar Dr. Jenila Livingston L M Dr. Jani Anbarasi L Dr. Amrit Pal Dr. Leninisha Shanmugam Dr. Abishi Chowdhury Dr. Logeswari G	Class Number	:	CH2023240501557 CH2023240501572 CH2023240501562 CH2023240501566 CH2023240501569 CH2023240501564 CH2023240503346
Duration	:	1 Hr. 30 Mins.	Max. Mark	:	50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information.
- Use statistical tables supplied from the exam cell as necessary
- Use graph sheets supplied from the exam cell as necessary
- Only non-programmable calculator without storage is permitted

Answer all questions

Q. No	Sub Sec.	Description	Marks
1		<p>Consider the following relation: $R(\text{Electrician_ID}, \text{Electrician_Name}, \text{Customer_ID}, \text{Customer_Name}, \text{Date}, \text{Defect}, \text{Solution_Code}, \text{Charge})$</p> <p>Each row in this relation represents a case where an electrician visits a customer and attends to a defect on a particular date. The defects are unique for each customer attended by the electrician. Each defect has a solution which is assigned a solution code and each solution code has a fixed charge associated with it. Each electrician and customer is provided with an electrician id and customer id respectively. Given this scenario, perform the following:</p> <ol style="list-style-type: none"> Identify the keys and functional dependencies. Which normal form is the current relation in? Justify your answer. Determine if the above relation can be decomposed to BCNF. 	[2] [1] [7]
2	a	Construct a B+ tree with order 4 for the following keys: 51, 63, 65, 77, 99, 52, 64, 76, 88, 100	[7]
	b	Delete 63 and 99 from the constructed tree and draw the final tree after deletion.	[3]
3		<p>Assume that a COMPANY schema comprises of the following relations:</p> <p>EMPLOYEE (fname, lname, initial, ssn, dob, address, gender, salary, supervisor_ssn, dno)</p> <p>DEPARTMENT (dname, dnumber, mgr_ssn, mgr_start_dt)</p>	

DEPT_LOCATIONS (dnumber, dlocation)

WORKS_ON (essn, pno, hours)

PROJECT (pname, pnumber, plocation, dnum)

DEPENDENT (essn, dependent_name, gender, dob, relationship)

Specify the relational algebraic expression on this schema for the following queries:

- Retrieve the names of all employees who work more than 10 hours per week on the 'ProductY' project.
- Retrieve the names of all employees who do not work on any project.
- For each department, retrieve the department name and the average salary of all employees working in that department.
- Retrieve the average salary of all female employees.
- List the last names of all department managers who have no dependents.

[S^2
= 10]

4

Consider the following tables:

DEPARTMENT(id, name)

PRODUCT(id, name, department_id, shelf_id, producer_id, price)

NUTRITION_DATA(product_id, calories, fat, carbohydrate, protein)

[10]

Using Heuristic optimization, draw the optimized query tree for the below query.

```
SELECT p.name AS product, d.name AS department FROM department d,  
product p, nutrition_data nd WHERE d.id = p.department_id and nd.product_id  
= p.id and p.price < 1000 and nd.fat = 0
```

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- a Let S1 be the schedule of operations comprising three transactions T1, T2 and T3 in a database system:

S1: R2(B), R1(A), R3(C), R1(B), W1(A), R2(C), W2(B), R3(A), W3(C)

[4]

Check whether the given schedule S1 is conflict-serializable or not? If yes, give the possible serialization order.

- b Using extendible hashing, hash the keys 17, 5, 6, 23, 24, 11, 30, 7, 10, 21, 27 with bucket size 3.

[6]

***** All the best *****