VIT

Vellore Institute of Technology

Continuous Assessment Test II – April 2024

Programme	: B.Tech. CSE and its specialization		Semester	: Winter 2023-24
Course	: Database Systems		Code	: BCSE 302L
Faculty and Class Number	: Dr A Muralidhar	(CH2023240501557)	Slot(s)	:
	Dr. L.Jani Anbarasi	(CH2023240501562)		
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Duration	: 1½ Hours		Max. Marks	: 50

Answer ALL the Questions

Q. No.	Sub-division	Question Text	Marks
1	a)	Consider the following relation:	10

PLANT	MANAGER	MACHINE	SUPPLIER_NAME	SUPPLIER_CITY
Plant-A	Ravi	Lath Boiler	Jay industry Abb apllance	Ahmedabad Surat
Plant-B	Meena	Cutter Boiler CNC	Raj machinery Daksh industry Jay industry	Vadodara Rajkot Ahmedabad

Plant, Supplier_name -> Manager, Machine, Supplier_city

Supplier_name -> Supplier_city

Manager->Supplier_city

Plant -> Machine

i) Find out the anomalies exists in the given relation. [2 marks]

ii) Normalize the given relation up to third normal forms. [8 marks]

2	a)	Construct a B+ Tree for the following key values in the order 4. (7marks) Key values are: (44, 55, 15, 18, 21, 24, 27, 30, 65, 77, 29, 92, 33)	10
	b)	Delete values 55 and 44 from the tree (3marks)	
3	a)	Suppose you have to insert the keys J, F, A, H, C, G, M, L, P in the mentioned order into an initially empty hash table of length 10 using any one open hashing with hash function h(k) = k mod 10. Consider the ASCII value to hash the given keys (A = 65, B = 66, and so on). What is the	10

resultant hash table? (4marks)

b) Hash the following keys using dynamic hashing with bucket size (6marks)

Keys	Equivalent binary representation
11	01011
4	00100
21	10101
25	11001
15	01111
1	00001
9	01001
20	10100
2	00010
17	10001
7	00111

4 a) Consider the following relations of a Banking Database Management System and answer the following queries in the form of relational algebra expressions.

Employee (E_id, Emp_name, salary, city)

Works_for (E_id, B_id)

Bank (B_id, Bank_name, city, phone)

i) Find the salaries of all the employees who live in the same city as the bank for which they work. [1 mark]

ii) List out the employee names residing in the city where DFC bank is located. [2 marks]

b) Consider the following relations of a University Database Management System:

Student (Reg_no, sName, phone, email_id, D_id)

Department (D_id, D_name, address)

Course (C_id, C_name, D_id, credits)

Result (C_id, Reg_no, Grade)

Write a query in SQL that finds the names, email ids, and grades of the students who have chosen Java Programming from CSE department. Demonstrate the step by step process towards query optimization. [7 marks]

5 a) Consider two transactions T_1 and T_2

T_1	T_2
begin transaction	begin transaction
read (A)	read (A)
read (B)	read (B)
read (C)	read (C)
B:= B+15	A:= A+15
C := C+1	C := C+1
write (B)	write (A)
write (C)	write (C)
commit	commit

Let the initial values of A and B be 100, and the initial value of C be 0. Show that every serial execution of these two transactions preserves the consistency of the database. (3marks)

b Consider the three transactions T1, T2, and T3, and the schedule S1.

Transaction T1: r1(x); r1(z); w1(x)
Transaction T2: r2(z); r2(y); w2(z); w2(y)
Transaction T3: r3(x); r3(y); w3(y)

Schedule S1: r1(x); r2(z); r1(z); r3(x); r3(y); w1(x); w3(y); r2(y); w2(z); w2(y)

i. Draw the serializability (precedence) for S1, state whether the schedule is conflict serializable. (5marks)
ii. Write down any two equivalent serial schedules. (2marks)

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