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Continuous Assessment Test-II – March 2023

Programme	:	B.Tech CSE	Semester	:	Win Sem(2022-23)
			Code	:	BCSE302L
Course Title	:	Database Systems	Class Nbr(s)	:	CH2022235000582 CH2022235000583 CH2022235000584 CH2022235000585 CH2022235000586 CH2022235000587
Faculty (s)	:	Dr. Janani T, Dr. Leninisha Shanmugam Dr. Rishikeshan CA, Dr. Tamilarasi K Dr. Brindha, Dr. Jaisakthi S M	Slot	:	B1+TB1
Time	:	90 Mins	Max. Marks	:	50 marks

Answer all the Questions

1. a) Find the minimal cover of the set of Functional Dependencies. **(5Marks)**
   Given: R= {A, B, C, D, E, H}, F: {A → BC, B → CE, A → E, AC → H, D → B}

   b) Suppose a relational schema R (A, B, C, D, E, F, G, H) and a set of Functional Dependency as followings. List all candidate keys of R. **(5Marks)** **10**

   CH → G,
   A → BC
   B → CFH
   E → A
   F → EG.

2. An Industry wants to maintain a database to keep track of Employees (PermanentEmployees, ContractEmployees) their children and their cars. For this purpose, initially in the relation:

   EmpData(Eid, EName, EAddress, cNbr, cName, cAddress, aLic, aMake)

Eid	EName	EAddress	cNbr	cName	cAddress	aLic	aMake
111	Nils	Adayar	333	Eva	Adayar	ABC123	Toyota
222	Anna	Adayar	333	Eva	Adayar	ABC123	Toyota
111	Nils	Adayar	444	Johan	Adayar	ABC123	Toyota
222	Anna	Adayar	444	Johan	Adayar	ABC123	Toyota
111	Nils	Adayar	333	Eva	Adayar	DEF456	Ford
222	Anna	Adayar	333	Eva	Adayar	DEF456	Ford
111	Nils	Adayar	444	Johan	Adayar	DEF456	Ford
222	Anna	Adayar	444	Johan	Adayar	DEF456	Ford

10

Eid, EName, EAddress is the emplyee number, name and address of a employee. cNbr, cName, cAddress is the corresponding information for a child. Each employee has exactly one address. aLic, aMake is the license number and make of a car. A car may be owned by more than one employee. The functional dependencies hold by the relation as follows

FD1. Eid →EName, EAddress
FD2. cNbr →cName, cAddress
FD3. aLic →aMake

a) Is this relation in BCNF? Justify. If not, decompose it into relations that are in BCNF. (6marks)

b) If the decomposed relations violates 4NF and then normalize it to make it satisfy the 4NF. (4marks)

3. Construct a B+ Tree by performing the below operations and give explanation at each step. Order of a node is three.

a) Insert the key values in the order (sun, fleet, bus, lindt, tent) and show the resulting B+ Tree. (3 marks)

b) After performing the above operation, delete the keys lindt, fleet in the given order and show the resulting B+ tree. (4 marks)

c) After performing the above operations, insert the keys in order (cane, pen, van) and show the resulting B+ tree (3 marks)

4. Considering the following relations, write a relational algebra expression followed by SQL query.

Flights (Flight Number, from, to, distance, departure_time, arrival_time, price)
Aircraft (aircraft_id, aircraft_name, cruising_range)
Certified (employee_id, aircraft_id)
Employees (employee_id, employee_name, salary)

Note: Employees relation describes pilots and other employees also. Every pilot is certified for some aircraft and only pilots are certified to fly.

a) Display the employees name of pilots who can operate planes with cruising range greater than 30000 miles but are nor certified on any Boeing. (5Marks)

b) For all aircrafts with cruising range over 1000 miles find the name of aircraft and the average salary of all pilots certified for this aircraft. (5Marks)

5. Consider the following relations of a university database.

Faculty (**EmpId**, Name, Phno, School, DateOfJoining)
Student (**RegNo**, Name,Phno,School)
Course (**CourseCode**, CourseName, Credits)
CourseAllocation (**ClassNumber**, AEmpId, ACourseCode,Venue, MaxStrength, Slot)
StudReg (**RegNo, ClassNumber**)

a) Provide an initial query tree to retrieve Name and Phone numbers of Faculty members who are handling DBMS (CourseName) and joined after 01-01-2023. (5Marks)

b) Convert the constructed canonical tree to optimized tree using Heuristic technique. Explain each step with appropriate trees. (5Marks)