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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E **Semester: IV**
Branch: Computer Science and Engineering **Duration: 3 hrs.**
Course Code: 19CS4PCDBM **Max Marks: 100**
Course: Database Management Systems **Date: 19.09.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1 a) Explain the difference between external, conceptual and internal schemas. How are these different schema layers related to the concepts of physical and logical data independence? **06**

b) Write SQL statements for the following schema: **08**

Stud (rollno, stuname, age, city, branchcode)
Branch (branchcode, branchname)

i. Retrieve student's details whose branchcode is 5.
ii. Display the names of the students of a specific branch without any repetition.
iii. Display roll no, stuname and age of students whose city is Chennai.
iv. Change the age of the student whose roll no is 1 to 20.
v. Delete student details whose age is between 18 and 20.

c) Consider the following relational schema and briefly answer the questions that follow: **06**
Emp(eid: integer, ename: string, age: integer, salary: real)
Works(eid: integer, did: integer, pct time: integer)
Dept(did: integer, budget: real, managerid: integer)

i. Define an assertion on Dept that will ensure that all managers have age > 30.
ii. Compare this assertion with the equivalent table constraint. Explain which is better.

UNIT - II

2 a) The Prescriptions-R-X chain of pharmacies has offered to give you a free lifetime supply of medicine if you design its database. Given the rising cost of health care, you agree. Here's the information that you gather: Patients are identified by an SSN, and their names, addresses, and ages must be recorded. Doctors are identified by an SSN. For each doctor, the name, specialty, and years of experience must be recorded. Each pharmaceutical company is identified by name and has a phone number. For each drug, the trade name and **10**

formula must be recorded. Each drug is sold by a given pharmaceutical company, and the trade name identifies a drug uniquely from among the products of that company. If a pharmaceutical company is deleted, you need not keep track of its products any longer. Each pharmacy has a name, address, and phone number. Every patient has a primary physician. Every doctor has at least one patient. Each pharmacy sells several drugs and has a price for each. A drug could be sold at several pharmacies, and the price could vary from one pharmacy to another.

Doctors prescribe drugs for patients. A doctor could prescribe one or more drugs for several patients, and a patient could obtain prescriptions from several doctors. Each prescription has a date and a quantity associated with it. You can assume that, if a doctor prescribes the same drug for the same patient more than once, only the last such prescription needs to be stored. Pharmaceutical companies have long-term contracts with pharmacies. A pharmaceutical company can contract with several pharmacies, and a pharmacy can contract with several pharmaceutical companies.

For each contract, you have to store a start date, an end date, and the text of the contract. Pharmacies appoint a supervisor for each contract. There must always be a supervisor for each contract, but the contract supervisor can change over the lifetime of the contract.

Draw an ER diagram that captures the preceding information

b) Explain weak entity type and discuss the role of partial key in design of weak entity type. **05**

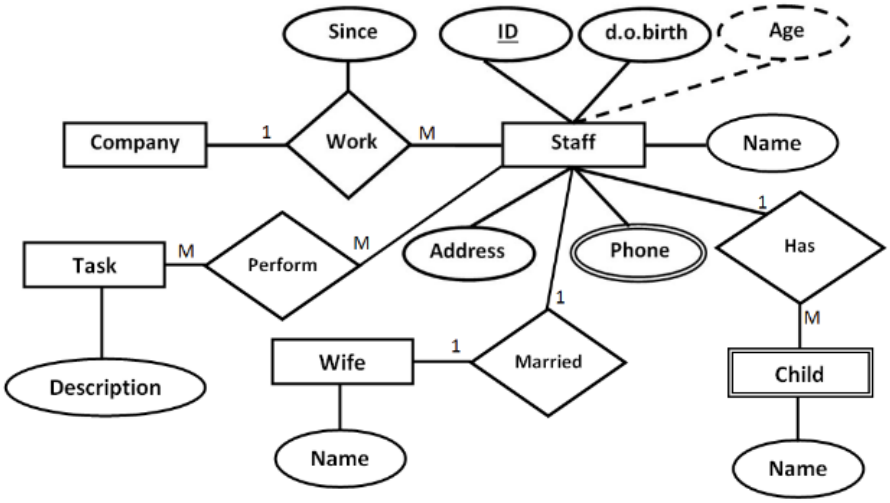
c) Consider a relation R(a, b, c) having the following tuples: **05**

(1, 20, 100), (4, 20, 100), (2, 15, 100), and (1, 18, 100)

Which of the following attributes or attribute combinations could be the primary key of the relation?

OR

3 a) Identify the number of tables required to implement the below given ER diagram by listing and specifying the reasons for each table. Apply the algorithm to convert the given ER diagram to relational table model. **10**



b) Suppose that we define the VENDOR and PRODUCT entities in the "VENDOR delivers PRODUCT" relationship as below: **05**

VENDOR (**VEND_CODE**, VEND_NAME, VEND_CONTACT)
PRODUCT (**PROD_CODE**, VEND_CODE, PROD_NAME, PROD_PRICE, PROD_ONHAND)

Further suppose that all products are delivered by vendors. Therefore, all vendors must be identified in the PRODUCT's FK. (That is, the VEND_CODE FK in PRODUCT is declared to be "not null.")

Given this brief description, what conclusions may be drawn about the PRODUCT entity and its relationship to the VENDOR entity?

c) Discuss total and partial participation constraints with an example. **05**

UNIT - III

4 a) Consider the following relational database schema consisting of the four relation schemas: **10**

passenger (pid, pname, pgender, pcity)
agency (aid, aname, acity)
flight (fid, fdate, time, src, dest)
booking (pid, aid, fid, fdate)

Answer the following questions using relational algebra queries:

i. Get the complete details of all flights to New Delhi
ii. Get the details about all flights from Chennai to New Delhi.
iii. Find only the flight numbers for passenger with pid 123 for flights to Chennai before 06/11/2020.
iv. Find the passenger names for those who do not have any bookings in any flights.
v. Find the agency names for agencies that located in the same city as passenger with passenger id 123.

b) Write the SQL Query for the following relation algebra expression: **05**

πBdate, Address (σfname='John' and Minit = 'B' AND LName='SUMITH'(Employee))

c) Explain the working of division operation with an appropriate example. **05**

OR

5 a) Suppose that we have the following relational database schemas **10**

Product(maker, model)
PC(model, speed, ram, hd, cd, price)
Laptop(model, speed, ram, hd, screen, price)
Printer(model, color, type, price)

With the assumption that model number are unique over all manufacturer and product types. This means that the above four relations have *model* as one of their keys.

i. Which manufacturers produce PC and laptop?
ii. Which manufactures produce at least two computers (PC or laptop) with the speeds of at least 133?
iii. Find all manufactures that produce printers but do not produce laptop.
iv. List the price of all the PC, laptop, and printer.
v. Find all manufactures that produce the fastest PC.

b) Discuss the informal design guidelines for relational schema design. **10**

UNIT - IV

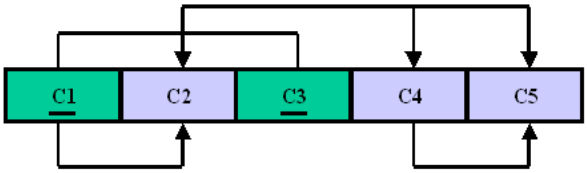
6 a) Consider a relation schema R(X,Y,Z,P,Q) with the following functional dependencies: **10**

XY -> P, P -> Z, and XP -> Q

i. Which of the above functional dependencies violates the 3NF condition? Why?

ii. Based on the results of i) decide whether R is in 3NF or not.

b) Identify and discuss each of the indicated dependencies in the dependency diagram shown below: **5**



c) Consider the following relation schema and set of functional dependancies: **5**

Emp-Dept (SIN, E_Name, B_Date, Address, D_Num, D_Name, D_Manager)

F={

SIN→{E_Name, B_Date, Address, D_Num},

D_Num→ {D_Name, D_Manager}

}

Calculate the closure of {SIN}+ and {D_Num}+ with respect to F.

UNIT - V

7 a) Describe the three steps in crash recovery in Aries. What is the goal of each phase? **06**

b) Consider the three transactions T1, T2 and T3 and schedules S1 and S2 given below. **08**

Determine whether each schedule is serializable or not?

T1 : r1(x); r1(z); w1(x);w1(z)

T2 : r2(y); r2(z); w2(z);

T3 : r3(y); r3(x); w3(y);

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

S2 : r1(x); r3(y); r2(y); r3(x); r1(z); r2(z); w3(y); w1(x); w2(z); w1(z);

c) What are the before image (BFIM) and after image (AFIM) of a data item? What is the difference between in-place updating and shadowing, with respect to their handling of BFIM and AFIM? **06**

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