① Select Tradename, sum(quantity)
FROM prescription_medicine
group by tname
having count(*) > 20;

② Select patient_ssn from prescription where
ID in (Select pid from prescription_medicine
where tradename in ('Paracetamol', 'Vitamin')
group by pid having count(
distinct(tradename)) = 2);

Mid-Semester Examination October 2024
Department of Computer Science
(Faculty of Mathematical Sciences)
University of Delhi, Delhi-110007

MCAC 104: Database Systems

Max Marks:30 **Time: 1 Hour**

1.	Consider the relations given below:
	`Doctor(SSN, Firstname, Lastname, Speciality, YearsOfExp, PhoneNum)`
	`Patient(SSN, Firstname, Lastname, Address, DOB, PrimaryDoc_SSN)`
	`Medicine(TradeName, UnitPrice, GenericFlag)`
	`Prescription(ID, Date, Doctor_SSN, Patient_SSN)`
	`Prescription_Medicine(PrescriptionID, TradeName, Quantity)`
	(pid)
	where
	`Medicine.GenericFlag` represents whether or not the medicine is generic (True or False).
	`Patient.PrimaryDoc_SSN` is a foreign key to `Doctor.SSN`
	`PrescriptionID` of `Prescription_Medicine` relation is a foreign key to `ID` attribute of `Prescription` relation.
	`Prescription_Medicine.TradeName` refers to `Medicine.TradeName`
	`Precription.Doctor_SSN` and `Prescription.Patient_SSN` are foreign keys to `Doctor.SSN` and `Patient.SSN` respectively.
	Write the SQL queries and relational algebra expressions to perform the following:
	i) For medicines written in more than 20 prescriptions, report the trade name and the total quantity prescribed.
	ii) List the `SSN` of patients who have `'Paracetamol'` and `'Vitamin'` trade names in one prescription
	iii) List the `SSN` of distinct patients who have `'Paracetamol'` prescribed to them by a doctor named `'Rakesh Sharma'`.
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2.	Draw an **ER diagram** for the following case study: Consider the domain of the XYZ College. There are teachers teaching the courses in the college. A teacher may teach a maximum of four courses. But, each course is taught by exactly one teacher. A set of books are defined for use in the college. A course may or may not use a book. A book may be used by at most one course. Also, if a book is in the list of books, it is being used by some courses in the college. A course may not use more than five books. A book is allocated to a course as a prescribed textbook or an additional reading.	8

John Doe

The **ER diagram** should include all the entities and relationships mentioned in the case study. Suitable attributes may be assumed for each entity and relationship.

The following ER constructs should be depicted:

- A composite attribute
- A multi-valued attribute
- A derived attribute
- Cardinality ratios (**1:1, 1:N, N:M**)
- Total/partial participation constraint

Design the relational schema for the above **ER diagram**, clearly stating the reasons for the schema design choices.

3. Consider the relations given below: 4

Employee (**empID**, **empName**, **empDept**)
Customer (**custID**, **custName**, **salesRepID**, **rating**)

In the **Customer** relation, **salesRepID** is the **ID** of the sales representative and refers to the **empID** of the **Employee** relation. Assume that the current database state ensures that each employee makes a sale to at least one customer.

Consider the following operations on **Customer** and **Employee**. Justify the result of each of the operations. Which of the above can violate referential integrity? Justify your answer.

i. INSERT a record into the Employee table
ii. DELETE the records from the Employee table where the employee department name (**empDept**) is **'Technology'**
iii. DELETE the records from the Customer table where the **salesRepID = 001**
iv. UPDATE the Employee table to change the employee ID (**empID**) of the employee **'Mohan Lal'** to **'030'**

4. Describe the three-schema architecture with the help of a suitable diagram. In this context, give a suitable example of data independence. 6