CSE 202, Winter Session 2022

Mid-Sem Exam

Name: **Roll No:** **Tutor ID:** **Tutor Name:** **Section:**

Time: 1 hr

Marks: 25

Weightage for mid-sem written part: 70%

Weightage for mid-sem implementation: 30%

Note: You need to create the tables with all constraints obtained in question 2 in MYSQL or any other DBMS (NO EDITS/ALTERATION IS ALLOWED) and run all SQL queries given in Question 5. It is your responsibility to give a demo to your tutor. Your tutor will check the implementation in your next tutorial class. This carries 30% (14%+4*4%) weightage.

Question 1: Let us design a DB for the following requirements:

The GoI plans to build a DB for managing the information about procurement, distribution of vaccines and booking of appointments in hospitals. The dept procures vaccines from various vendors and then distributes them to local health centers for vaccinations to citizens. A citizen books an appointment in a hospital for vaccination.

A citizen may choose the vaccination type (Covishield/Covaxin) and whether it is their first, second or booster shot [based on their vaccination status] while booking an appointment in a hospital. The citizen also chooses the date, time slot and a hospital (Hid, Hname, Hlocation, License number) they want to get vaccinated at. While booking an appointment, a citizen is required to give all personal information including Aadhaar number, name, date of birth, city, and a phone number. It may happen that some citizens may not appear on their scheduled appointment date/time. In this case, they need to rebook and get fresh appointments. Your database design should register the information whether a citizen appeared at the scheduled appointment date/time, and the current vaccination status of a citizen. The system calculates the age based on DOB and categorizes citizens as teenagers, adults and senior citizens for analysis. Only double vaccinated people in the third category can opt for a booster shot while the teenagers are not eligible for vaccination. Citizens may book vaccination appointments for multiple people.

Since there are a sufficient number of vaccines in hospitals, CMO would like to get the status of vaccine inventory and how many folks are covered in their health center each day. If the inventory falls below a certain threshold, the CMO office will send a fresh order for the next supply. To make sure a citizen gets an appointment, the health center checks whether appointments are available before booking the appointment and updates the DB once the citizen gets an appointment.

Vendors must register on the portal to sell vaccines to the GoI by entering details about the vendor, their organisation, details of type and number of vaccines available for sale, and vaccine price quotation. They must also upload a document to prove that they are authorized to sell vaccines. The GoI advertises for vendors via digital and print media.

Vaccine requests by hospitals and applications from vendors are approved by GoI officials. The costs of vaccines sold by GoI to health centers and by health centers to the citizens are fixed. However, the GoI may have a mutual negotiation with vendors for different bulk rates. All information about the sale of vaccines to hospitals and procurement of vaccines from vendors is stored in the system.

Design and draw an ER diagram of blue color text description ONLY. List your assumptions, if any. We will accept all reasonable assumptions. Your E-R diagram should clearly –

- Identify all entities and their attributes (atomic, multi-valued, derived) (1+2)
- Identify a weak entity set (1)
- Identify relationships between these entities including ternary relationship (if any) (2)
- Identify and underline the primary key of each entity (1)

Question 2: Convert your E-R diagram of Question 1 into relational schemas. Underline the Primary Key and list all candidate keys in each relational schema. (3+1+1)

Question 3: If GoI also wants the data about the allergies (more than one) that a citizen has, then what extension you would like to make in the Relational Schema obtained in Q2 for a 'good database design'. Explain with an example. (2+2)

Question 4: Write the Relational Algebraic Expression (RAE) for each of the following query on relational schemas of Question 2. (1+1+1)

1. List all citizens that have requested for 'Covishield'.
2. List the hospitals that are available for booking on '2022-03-14'.
3. List all double vaccinated citizens who have not taken booster shots.

Question 5: Write the SQL statement on relational schemas of Question 2 for (1.5*4)

1. List all citizens that have requested for Covishield.
2. List hospitals that are available for booking on '2022-03-01'.
3. Create a view of all double vaccinated citizens who have not taken booster shots.
4. Find the average age of single vaccinated citizens in 'Delhi'.