Q1.

   a. Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examinations conducted.
   b. Construct appropriate tables for the above ER Diagram

Q2.

Consider the view defined below. Can this view be updated? Justify.
CREATE VIEW employee_yos AS
SELECT
employee_id, dept_name
first_name || ' ' || last_name full_name,
FLOOR(months_between(CURRENT_DATE, hire_date)/ 12) yos
FROM
Employees, department;

Q3.

Compute the canonical cover for the following set F of functional dependencies for the relation schema R (A, B, C, D, E). F: {A-> B; AB -> C; D-> AC; D-> E}

Q4.

Consider a database used to record the marks that students get in different exams of different course offerings.

   a) Construct an E-R diagram that models exams as entities, and uses a ternary relationship, for the above database.
   b) Construct an alternative E-R diagram that uses only a binary relationship between students and course-offerings. Make sure that only one relationship exists between a particular student and course-offering pair, yet you can represent the marks that a student gets in different exams of a course offering.

Q5.

   a. Design an E-R diagram for keeping track of the exploits of your favorite sports team. You should store the matches played, the scores in each match, the players in each match and individual player statistics for each match. Summary statistics should be modeled as derived attributes.
   b. Extend the E-R diagram of the previous question to track the same information for all teams in a league.

Q6.

Consider the schema as given below and write the queries given using SQL

Customer= (customer-name, customer-street, customer-city)

Borrower = (customer-name, loan-number)

Account = (account-number, branch-name, balance)

Depositor= (customer-name, account-number)

i. Find all customers who have an account but no loan at the bank.

ii. Find the average balance for each customer who lives in Harrison and has

at least three accounts.

iii. Find all branches where the total account deposit is less than the average of

the total account deposits at all branches

Q7.

A company manages an employee database and is contemplating the addition of a new feature to track employees' project assignments without disrupting existing data. Describe how logical independence can be leveraged to introduce this new relationship between entities without affecting the existing relationships in the employee database.

Q8.

Consider an online bookstore database with the following entities:

Books Table: BookID, Title, AuthorID, ISBN, Genre

Authors Table: AuthorID, AuthorName, Nationality, Birthdate

i.   Describe which of the columns should have unique value
ii.   Explain which of the columns shall be NOT NULL in the Authors table. What does this constraint ensure?
iii.   Identify candidate keys for the Authors table and justify.
iv.   Is it appropriate to use BookID as the primary key for the Books table? Provide reasons for your choice.
v.   How do we maintain data integrity between two tables.

Q9.

Consider a dataset that stores information about students, courses, grades, and multiple phone numbers associated with each student

StudentID	StudentName	CourseID	Grade	Phone Numbers
1	Alice	101	A	123-456-7890, 987-654-3210
2	Bob	102	B	234-567-8901
3	Charlie	101	A	345-678-9012, 456-789-0123
4	David	103	C	567-890-1234
5	Eve	102	B	678-901-2345, 789-012-3456
6	Charlie	103	A	789-012-3456

   i.   Explain the anomalies present in the unnormalized data. Provide specific examples based on the given data.

  ii.   Describe the process of achieving the First Normal Form (1NF) for the given data

 iii.   Extend the normalization process to achieve the Second Normal Form (2NF)

 iv.   Finally, proceed to the Third Normal Form (3NF)