Databases

Sample

Examination Paper

Answer ALL questions.

Clearly cross out surplus answers.

Time: 3 hours

The maximum mark for this paper is 100.

Any reference material brought into the examination room must be handed to the invigilator before the start of the examination.

Marks

Answer ALL questions

Marks

Question 1

a) Define metadata in the context of a Database Management System. Then provide ONE (1) example of metadata and outline THREE (3) kinds of information it might contain. **4**

b) What roles do the Data Definition Language (DDL) and Data Manipulation Language (DML) play in a DBMS? Provide TWO (2) examples of operations for each. **6**

Total 10 Marks

Question 2

(a) ACID is an acronym that stands for four key properties critical to database transactions. Identify these four properties and provide an explanation of each property. **8**

(b) Define and distinguish the terms ***data*** and ***information***. **2**

Total 10 Marks

Question 3

Scenario: **10**

A local hobby club organises various workshops throughout the year, covering different activities such as painting, photography, and cooking. Each workshop can be attended by many members of the club, and each member can sign up for multiple workshops based on their interests.

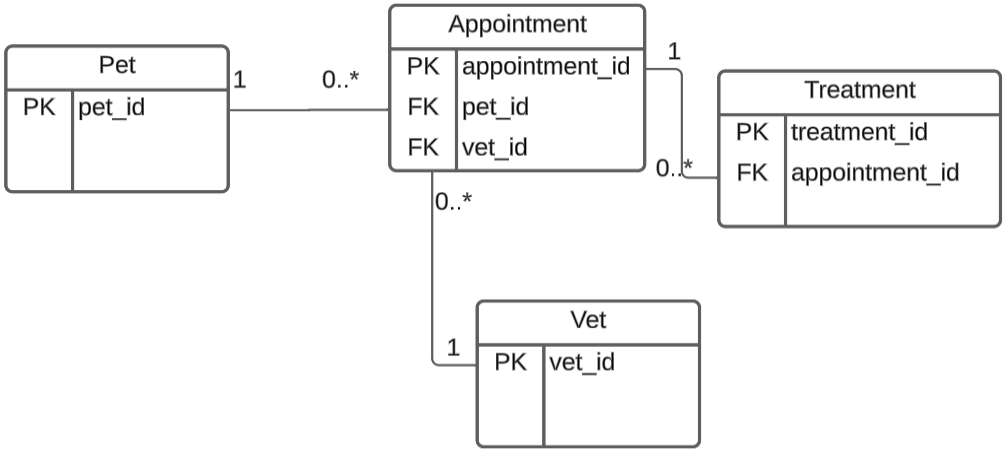
Draw an Entity Relationship Diagram to represent the scenario described above. You need to identify entities, relationships, cardinality, label all the primary keys and foreign keys. Clearly state which entity the keys belong to.

Total 10 Marks

Marks

Question 4

(a) The following ERD represents a veterinary clinic system where pet owners bring their pets to the clinic. Each pet can have multiple appointments and treatments. Each vet can handle multiple appointments but can only work on one treatment at a time.



Create a CRUD matrix to show the following transactions:

- Transaction 1 – Register a new pet
- Transaction 2 – Schedule a new Appointment for a registered pet
- Transaction 3 – Delete a vet and all their treatments
- Transaction 4 – Update a pet's medical history after a completed treatment

4

(b) A number of business rules have been defined for the veterinary clinic database system. Discuss how each might be enforced on the system.

Rule 1: All pets must have a recorded check-in date for their appointments. Pets that have not visited the clinic for over two years should be flagged for a wellness check reminder.

Rule 2: Pets should be categorised based on whether they are regular patients or referred by another clinic (categorised as ‘Regular’ or ‘Referred’).

Rule 3: Pets should be allowed to have follow-up appointments for treatments that were not successful, with a record of the initial treatment and the follow-up treatent linked for reference.

6

Total 10 Marks

Marks

Question 5

(a) A university maintains a spreadsheet to track student enrollments in courses, recording each student's ID and name, along with the name, code, and duration of each course. The current structure of the data does not conform to the First Normal Form. **8**

Convert the provided data into 1NF.

student_id (PK)	student_name	enrollment
35365	John Smith	Computer Science, CS101, 3
27810	Jane Doe	Biology, BIO204, 4
63790	Bob Johnson	Computer Science, CS101, 3

(b) Discuss the importance of relational integrity. **2**

Total 10 Marks

Question 6

Based on the scenario provided in Question 5. Write the appropriate SQL commands to perform each of the following tasks.

(a) Create the `student` table. Assume the course table has been created. **6**

(b) The `student` table needs to be updated to include a new column named `email` to store student email addresses. **2**

(c) The `duration` column in the `course` table is not needed and should be removed. **2**

Total 10 Marks

Marks

Question 7

Scenario: Zoo Database System

This zoo database system is designed to manage information about the animals, their habitats, and feeding schedules. Below are the tables with sample data.

animal

animal_id	animal_name	species	habitat_id
1	Leo	Lion	1
2	Stripes	Tiger	2
3	Polly	Parrot	3
4	Slithers	Snake	4

habitat

habitat_id	habitat_name	environment
1	Savannah	Grassland
2	Tiger Trail	Forest
3	Bird Paradise	Tropical
4	Reptile House	Temperate

feeding_schedule

schedule_id	animal_id	food	feeding_time
1	1	Meat	14:00
2	2	Chicken	12:00
3	3	Seeds	08:00
4	3	Fruits	15:00
5	4	Mice	20:00

a) Write a SQL command to retrieve a list of all animals along with their habitat names. Include both the animal's name and the habitat name in your results. **3**

(b) Write a SQL command to find the total number of feedings scheduled for each type of food. The result should list the food type and the total number of feedings. **3**

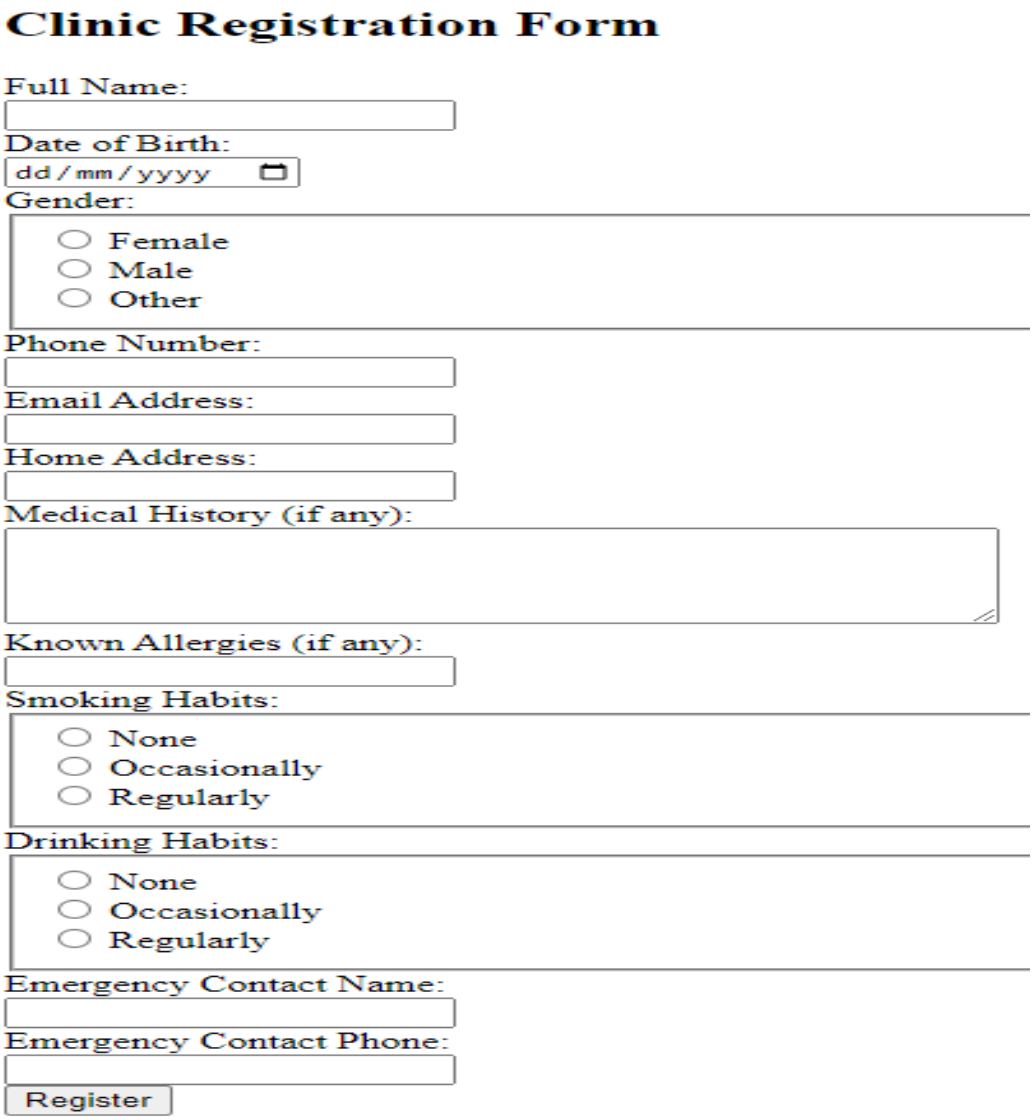
(c) Write a SQL command to list the names of the animals that need to be fed more than once per day. Include the names of the animals and the number of times it is fed in your results. **4**

Total 10 Marks

Marks

Question 8

You are provided with a paper form that every new patient is required to fill out upon registering at a clinic. This form collects various information necessary for the clinic's patient management system. **10**



Identify TEN (10) data fields that are collected from the new patient.

Total 10 Marks

Marks

Question 9

(a) It is crucial to protect sensitive information from unauthorised access and potential breaches. Identify THREE (3) strategies that are essential for safeguarding a database. Provide a description of how it contributes to the overall security of the database system. **6**

(b) Identify TWO (2) advantages of Cloud databases **and** provide an explanation of each advantage. **4**

Total 10 Marks

Question 10

(a) Big data is often characterised by the 3Vs. Identify the 3Vs and provide a brief explanation of each. **6**

(b) List FOUR (4) types of NoSQL databases. **4**

Total 10 Marks

End of Paper