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

Autonomous Institute Affiliated to VTU

October 2023 Semester End Main Examinations

Programme: B.E   Semester: IV
Branch: Information Science and Engineering   Duration: 3 hrs.
Course Code: 19IS4PCDBM   Max Marks: 100
Course: Database Management System

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 advantages of database management system.   **04**

b)   Identify the number of tables required to implement the below given ER   **08**
diagram by listing and specifying the reasons for each table. Apply the
algorithm to convert the given ER diagram to relational table form. Given
cardinality ratio between Doctors and Patients is 1: n and Patients to Tests is
m:n.
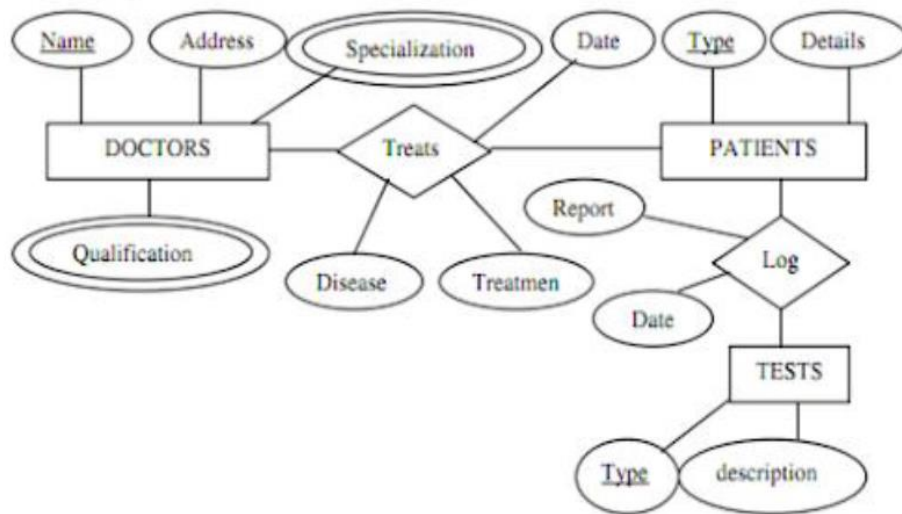
c)   Design an ER diagram for a Pet Service given the following requirements   **08**
and mention the different notations used in ER diagram.
   i)   A pet clinic treats many different types of pets.
   ii) The owner of the pet consumes the services of the pet clinic and the
        pet store which provides pet grooming services.
   iii) The attributes of the owner are ID, Fname, Lname, Contactno,
        Alternate Contactno and address.
   iv) Assume necessary attributes for the other entities.
   v)   Provide the cardinality of relationships and justify your answer.

2 a) Consider the Supplier-Parts-Catalog schema as shown below. **08**
       Suppliers (sid: integer, sname: string, address: string)
       Parts (pid: integer, pname: string, color: string)
       Catalog (sid: integer, pid: integer, cost: real)
       Write Relational Algebraic expressions for the given queries:
       i)   Find the ID's of suppliers who supply some red or green part.
       ii) Find the names of the suppliers supplying some red part for less than Rs.100
       iii) Find the ID and names of the suppliers to supply some red part and some green part and are based at Bangalore.
       iv) Find the Id's of the suppliers who supply only red part.

   b) For the given bag **06**
       i) Find theta join with condition R.B<S.B
       ii) Find Left outer Join on R and S
       iii) Find Union and Intersection of R and S
       iv) Find natural join of R and S

       Relation R

A	B
1	2
1	3
5	6
1	2

       Relation S

B	C
3	4
7	8

   c) Explain Union, Intersection and differences in Relational algebra. **06**

OR

3 a) Differentiate the following with relevant explanation and examples: **08**
       1. Primary key and foreign keys.
       2. Check and Not NULL constraints.
       3. Aggregation grouping and Outer joins.
       4. Alter table and modify table commands.

   b) Demonstrate how to create Views in SQL with an example. Identify its advantages and disadvantages. **06**

   c) Given the schema: **08**
            Passenger (Pid, Pname, Pgender, Pcity)
            Agency (aid, anme, acity)
            Flights (fid, fdate, time, src, dest)
           Booking (pid, aid, fid, fdate)
       Write the queries in SQL for the following:
       i)   Find only the flight numbers for passenger with pid 123 for flights to Chennai before 06/11/2022.
       ii) Find the passenger names for those who do not have any bookings in any flights.

iii)   Get the details of flights that are scheduled on both dates 01/12/2022 and 02/12/2022 at 16:00 hours.

iv)   Find the details of all male passengers who are associated with jet agency.

UNIT - III

4   a)   Define CAP theorem. Explain its application to NoSQL systems   **06**

    b)   Give the Mongodb commands for the following questions.   **08**
- i)   Create a collection in a database using name as bmsce.
- ii)   Insert 3 documents into the collection name bmsce.
- iii)   Command used to check the inserted data.
- iv)   Command used to update or modify the existing documents of a collection. And illustrate for the inserted data.
- v)   Command to remove a document that match a specific condition.

    c)   Illustrate the advantages and disadvantages of NOSQL.   **06**

UNIT - IV

5   a)   Differentiate the following with examples: **10**
- i)   Closure of attribute and Trivial Functional Dependencies.
- ii)   BCNF and 3NF

    b)   A relation R has four attributes ABCD. For each of the following sets of Functional dependencies, identify the candidate key and the highest form: **10**
- i) $C \rightarrow D$, $C \rightarrow A$, $B \rightarrow C$
- ii) $B \rightarrow C$, $D \rightarrow A$
- iii) $ABC \rightarrow D$, $D \rightarrow A$

OR

6   a)   i) Find the candidate keys present in this given relation R (A, B, C, D) and Functional dependency is $\{AB \rightarrow CD, D \rightarrow B, C \rightarrow A\}$ **10**

ii) For the given relation R (A, B, C, D, E, F) and Functional dependency is $\{AB \rightarrow C, C \rightarrow DE, E \rightarrow F, D \rightarrow A, C \rightarrow B\}$
Find the Closure of Attributes.
For AB^+, A^+, ABF^+, DB^+, EF^+, CB^+, CBC^+, DEF^+, D^+, F^+
Identify the super keys and candidate keys. Justify your answer.

    b)   Identify trivial and non trivial functional dependencies existing in this given relation. Provide justification for your answers.   **05**

emp_id	emp_name	emp_address	emp_mobile
101	Herschel	New Delhi	8912312390
102	Jon	Kanpur	8812121212
102	Jon	Kanpur	9900012222
103	Ron	Chennai	7778881212
104	Lester	Bangalore	9990000123

c) Determine all the Functional dependencies existing in the given relation.   **05**

ROLL NO	NAME	MARKS
1	A	78
2	B	60
3	A	78
4	B	60
5	C	80

UNIT - V

7 a) Identify whether the following schedule is conflict serializable using the   **10**
Precedence Graph and determine all the possible schedules.
   i)   S: r2(A); r2(B); w1(A); w2(A); w3(A);w3(B);r1(B);
   ii)   For the given Schedule: S1 given below

```
            Schedule:  S1
       _____
      |   T1      |   T2      |   T3
      |           |           |
      |  r1(X)    |           |
      |           |  r2(Z)    |
      |  r1(Z)    |           |
      |           |           |  r3(X)
      |           |           |  r3(Y)
      |  w1(X)    |           |
      |           |           |  w3(Y)
      |           |  r2(Y)    |
      |           |  w2(Z)    |
      |           |  w2(Y)    |
```

b) With an example give the description of two phase locking system in detail.   **10**

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