IT214_Database Management Syst... ✔ Total (6) Easy (0) Medium (6) Difficult (0)

Q. Identify all 'PERSON" type entities you expect to find in the following well known databases. List all the important attributes and constraints for each 'Person' type entity which is part of each of the following databases:

a. Database of Online Grading of Examinations
b. Indian Classical Music Database
(4 Marks)

4.IT214_DATABASE MANAGEMENT SYSTEM_16TH MEDIUM

Q. Explain the disadvantages when you declare Covering constraint to be TRUE ? How is it related to an Overlapping Constraint declaration? **(6 Marks)**
(Answer this question using an example constructed by you)

Note: (Explain using an example constructed by you. No credit will be given if you are using the example/s discussed in the class or anywhere else).

6.IT214_DATABASE MANAGEMENT SYSTEM_16 MEDIUM Duplicate Select

Q. Explain the following statements with the help of appropriate concrete example/s constructed by you:

The Owner Entity Set and the Weak Entity Set must participate in a one-to many identifying relationship set where the Weak Entity Set must have total participation in the identifying relationship set. **(6 Marks)**

IT214_Database Management Syst... ✔ Total (6) Easy (0) Medium (6) Difficult (0)

Q. Explain the following statements with the help of appropriate concrete example/s constructed by you:

The Owner Entity Set and the Weak Entity Set must participate in a one-to many identifying relationship set where the Weak Entity Set must have total participation in the identifying relationship set. **(6 Marks)**

Note: (Explain using an example constructed by you. No credit will be given if you are using the example/s discussed in the class or anywhere else).

6.IT214_DATABASE MANAGEMENT SYSTEM_16 MEDIUM

Q. Justify the following statement in the context of the view/s on a relation using an example constructed by you: :

In some cases it is not possible to insert rows in a relation through a view. **(4 Marks)**
Note: (Explain using an example constructed by you. No credit will be given if you are using the example/s discussed in the class or anywhere else).

4.IT214_DATABASE MANAGEMENT SYSTEM_16TH MEDIUM Duplicate Select

Q. Suppose relation R (A, B) has tuples { (1,2), (1,2),(3,4) } and relation S (B, C) has tuples { (2,5), (2,5), (4,6), (7,10) }.

Write down all tuples in the result of the SQL query:
SELECT *

the example/s discussed in the class or anywhere else).

6.IT214_DATABASE MANAGEMENT SYSTEM_16 MEDIUM

Q. Justify the following statement in the context of the view/s on a relation using an example constructed by you: :

In some cases it is not possible to insert rows in a relation through a view. **(4 Marks)**
Note: (Explain using an example constructed by you. No credit will be given if you are using the example/s discussed in the class or anywhere else).

4.IT214_DATABASE MANAGEMENT SYSTEM_16TH MEDIUM

Q. Suppose relation R (A, B) has tuples { (1,2), (1,2),(3,4) } and relation S (B, C) has tuples { (2,5), (2,5), (4,6), (7,10) }.

Write down all tuples in the result of the SQL query:
SELECT *
FROM R NATURAL JOIN S
(4 Marks)

4.IT214_DATABASE MANAGEMENT SYSTEM_16TH MEDIUM

Q. Some database models do not have a way to enforce referential integrity constraints. Explain this statement referring to one such data model. **(4 Marks)**

4.IT214_DATABASE MANAGEMENT SYSTEM_16TH MEDIUM

IT214_Database Management Syst... ✔ Total (20) Easy (20) Medium (0) Difficult (0)

IT214_DATABASE MANAGEMENT SYSTEMS_SECTI... EASY

Q. Consider the Instructor (I-ID, I_name, dept_name, (address), salary) relation from University E-R model, the attribute address can be represented:

- Using a separate entity set as attributes cannot be set valued
- Using a separate entity set having an attribute street if we want to find instructors having their residence on the same street.
- Using a separate entity set if Address is connected through relationship set/s with some other entity set/s in addition to the Instructor
- Using a separate entity set as addresses as always shown as entity sets in the E-R model.

IT214_DATABASE MANAGEMENT SYSTEMS_SECTI... EASY

Q. Consider the following query on the relation R (A, B, C, D) Where A,B,C, D take integer values

```
SELECT  [...]
FROM  R
GROUP BY A, B
```

Which of the following can appear in the position marked as [....] in select clause above

I. *MIN(C+D)*

Q. Consider the following query on the relation R (A, B, C, D) Where A,B,C, D take integer values

SELECT [...]
FROM R
GROUP BY A, B

Which of the following can appear in the position marked as [....] in select clause above

I. *MIN(C+D)*
II. *A,B*
III. *C,D*

- II only.
- I and II only.
- I, II, and III.
- None

IT214_DATABASE MANAGEMENT SYSTEMS_SECTI... EASY

Q. Answer the following in the context of the *Specialization* in the E-R Model of *Digital Library Database Management System.*

IT214_Database Management Syst... ✔ Total (20) Easy (20) Medium (0) Difficult (0)

Q. Answer the following in the context of the *Specialization* in the E-R Model of *Digital Library Database Management System.*

This Specialization contains *Resource* (resource_ID, title, price) as a *super entity set.* It has 3 *sub entity sets* :

- *Books*(author, publisher, no of Pages)
- *Journals* (publication year, volume, editor, list of papers)
- *Videos* (format, length)

What options you have when you *map this Specialization* to the corresponding *Relational Model* representation? How *covering constraints* influence the choice?

IT214_DATABASE MANAGEMENT SYSTEMS_SECTI... EASY

Q. Clearly explain the *DBMS* versus *File System* Approach in the context of the *Online Registration Database Management System of DAIICT.*

IT214_DATABASE MANAGEMENT SYSTEMS_SECTI... EASY

Q. List the options we have in SQL (applicable to the other entity set) when we delete tuples from the strong entity set in a relationship when the other entity set is a strong or weak entity set.
Note: (*Explain using an example constructed by you*)
(*No credit will be given if you are using the example/s discussed in the class*)

IT214_DATABASE MANAGEMENT SYSTEMS_SECTI... EASY

IT214_Database Management Syst... ✔ Total (20) Easy (20) Medium (0) Difficult (0)

Q. Explain the following statements with the help of *appropriate concrete example/s constructed by you*:
The Owner Entity Set and the Weak Entity Set must participate in a *one-to many* identifying relationship set where the Weak Entity Set must have *total participation* in the identifying relationship set.
(No credit will be given if you are using the example/s discussed in the class)

IT214_DATABASE MANAGEMENT SYSTEMS_SECTI... EASY

Q. Some database models do not have a way to enforce referential integrity constraints. Explain this statement with one such example data model.

IT214_DATABASE MANAGEMENT SYSTEMS_SECTI... EASY

Q. Consider relations from the University database:
Instructor (I-ID, I_name, dept_name, salary) Department (dept_name, building, budget)

Pick up the correct statements in the context of the View and the Insertion done through it:

```
create view instructor_info as
    select ID, name, building
     from instructor, department
     where instructor.dept_name= department.dept_name;

insert into instructor_info
values ('69987', 'White', 'Taylor');
```

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```
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     from instructor, department
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insert into instructor_info
values ('69987', 'White', 'Taylor');
```

- [ ] These updates to Department and Instructor do not have the desired effect on instructor_info
- [ ] Updations having null values in instructor and department do not get desired update on instructor_info
- [ ] View is legal but the insertion is illegal because of the missing PK of Department in the insertion statement
- [ ] Both the view and the insertion are legal as insertion doesn't depend on the PK of the either relation

IT214_DATABASE MANAGEMENT SYSTEMS_SECTI... EASY

IT214_Database Management Syst... ✔ Total (20) Easy (20) Medium (0) Difficult (0)

Q. The Boat Club/ Sailors Database contains information regarding the reservations made by sailors for the boats. It contains relations:
Sailors S (sid:integer, sname:string,rating:integer,age:real)
Boats B (bid:integer,bname:string,color:string)
Reserves R (sid:integer, bid:integer,day:date)

Pick up the correct SQL queries for:

Find age of the youngest sailor with age>=18, for each rating with at least two such sailors

- SELECT S.rating, MIN (S.age) AS minage
  FROM Sailors S
  WHERE S.age >= 18
  GROUP BY S.rating
  HAVING COUNT (*) > 1
- SELECT S.sid, S.rating, MIN (S.age) AS minage
  FROM Sailors S
  WHERE S.age >= 18
  GROUP BY S.rating
  HAVING COUNT (*) > 1
- SELECT S.rating, MIN (S.age) AS maxage
  FROM Sailors S
  WHERE S.age >= 18
  GROUP BY S.rating

Q. The Boat Club/ Sailors Database contains information regarding the reservations made by sailors for the boats. It contains relations:

Sailors S (sid:integer, sname:string,rating:integer,age:real)
Boats B (bid:integer,bname:string,color:string)
Reserves R (sid:integer, bid:integer,day:date)

Pick up the correct SQL queries for;

Find sids of sailors who've reserved a red and a green boat

- [ ] SELECT S.sid
FROM Sailors S, Boats B, Reserves R
WHERE S.sid=R.sid AND R.bid=B.bid
AND (B.color='red' OR B.color='green')
- [ ] SELECT S.sid
FROM Sailors S, Boats B1, Reserves R1,
Boats B2, Reserves R2
WHERE S.sid=R1.sid AND R1.bid=B1.bid
AND S.sid=R2.sid AND R2.bid=B2.bid
AND (B1.color='red' AND B2.color='green')
- [ ] SELECT S.sid
FROM Sailors S, Boats B, Reserves R
WHERE S.sid=R.sid AND R.bid=B.bid
AND B.color='red'
INTERSECT
SELECT S.sid
FROM Sailors S, Boats B, Reserves R
WHERE S.sid=R.sid AND R.bid=B.bid
AND B.color='green'

- SELECT S.sid
  FROM Sailors S, Boats B, Reserves R
  WHERE S.sid=R.sid AND R.bid=B.bid
  AND (B.color='red' OR B.color='green')
- SELECT S.sid
  FROM Sailors S, Boats B1, Reserves R1,
  Boats B2, Reserves R2
  WHERE S.sid=R1.sid AND R1.bid=B1.bid
  AND S.sid=R2.sid AND R2.bid=B2.bid
  AND (B1.color='red' AND B2.color='green')
- SELECT S.sid
  FROM Sailors S, Boats B, Reserves R
  WHERE S.sid=R.sid AND R.bid=B.bid
  AND B.color='red'
  INTERSECT
  SELECT S.sid
  FROM Sailors S, Boats B, Reserves R
  WHERE S.sid=R.sid AND R.bid=B.bid
  AND B.color='green'
- SELECT S.sid
  FROM Sailors S, Boats B, Reserves R
  WHERE S.sid=R.sid AND R.bid=B.bid AND B.color='red'
  AND S.sid IN (SELECT S2.sid
  FROM Sailors S2, Boats B2, Reserves R2
  WHERE S2.sid=R2.sid AND R2.bid=B2.bid
  AND B2.color='green')

IT214_Database Management Syst... ✔ Total (20) Easy (20) Medium (0) Difficult (0)

Q. Following is one of the disadvantages of creating a 'view':

- It realizes only at the run time
- It wastes space and computational power
- Query processing with minimal optimization is not possible with views
- Security of data is compromised

IT214_DATABASE MANAGEMENT SYSTEMS_SECTI... EASY

Q. Pick up the most appropriate list of person type relations for any Loksabha Election Database:

- members and students
- candidates and citizens
- Candidates, Voters, Chief Election Commissioner, Election Officers
- Candiates and Election Officers

IT214_DATABASE MANAGEMENT SYSTEMS_SECTI... EASY

Q. Multivalued Attributes in E-R model are mapped to relational model using:

- One big composite attribute
- Simple composite attribute
- A separate relation
- A relation consisting only of composite attributes

IT214_DATABASE MANAGEMENT SYSTEMS_SECTI... EASY

Q. The relational model guarantees:

- Atomic values

IT214_Database Management Syst... ✔ Total (20) Easy (20) Medium (0) Difficult (0)

Q. The relational model guarantees:

- Atomic values
- Atomic and nonatomic values
- Set values
- Integer values

IT214_DATABASE MANAGEMENT SYSTEMS_SECTI... EASY

Q. Pick the odd one out

- Primary key
- Candidate key
- Foreign key
- Super key

IT214_DATABASE MANAGEMENT SYSTEMS_SECTI... EASY

Q. We have the following dealership data in the Dealership_table

Dealership	*Cars_sold*	*Profit*
Seva	100	50000
Aryan	200	10000
Only BMW	NULL	40000
Ford Auto	50	25000

The query: *SELECT COUNT (Cars_sold) from Dealership table* returns *value*:

- 350
- NULL
- 3

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Ford Auto	50	25000

The query: *SELECT COUNT (Cars_sold) from Dealership table* returns *value*:

- 350
- NULL
- 3
- None of the Above

IT214_DATABASE MANAGEMENT SYSTEMS_SECTI... EASY

Q. Which of the following statements about E/R models is/are correct?

I. Many-to-many relationships cannot be represented in E/R-diagrams

II. Relationship sets can have attributes of their own.

III. All many-to-one relationships are represented by a relationship between a weak and a non-weak entity set.

- II only.
- III only.
- II and III only.
- I and II only.

IT214_DATABASE MANAGEMENT SYSTEMS_SECTI... EASY

Q. Consider a relation *R (A,B)* which may have *duplicate tuples*,

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- II only.
- III only.
- II and III only.
- I and II only.

IT214_DATABASE MANAGEMENT SYSTEMS_SECTI... EASY

Q. Consider a relation *R (A,B)* which may have *duplicate tuples*,

Query1:

*SELECT * FROM R;*

Query 2:

*(SELECT * FROM R)*
INTERSECT
*(SELECT * FROM R);*

- Query 1 and Query 2 always produce the same answer.
- The answer to Query 1 is always contained in the answer to Query 2.
- The answer to Query 2 is always contained in the answer to Query 1.
- Query 1 and Query 2 produce different answers.

IT214_Database Management Syst... ✔ Total (8) Easy (0) Medium (8) Difficult (0)

IT214_DATABASE MANAGEMENT SYSTEMS_LA_SE... MEDIUM

Q. State all the attributes and Primary Key of the relation mentioned for each of the following database systems:

a. Attributes for relation **Librarian** of *Digital Library Database System*

b. Attributes for relation **Voter** of *Loksabha Election Database System*

c. Attributes for relation **Order** of *Online Shopping Database System*

IT214_DATABASE MANAGEMENT SYSTEMS_LA_SE... MEDIUM

Q. Suppose relation **R (A, B)** has tuples **{ (1,2), (1,2),(3,4) }** and relation **S (B, C)** has tuples **{ (2,5), (2,5), (4,6), (7,10) }.**

Write down all the tuples in the result of the SQL query:

```
SELECT *
FROM R NATURAL OUTER JOIN S
```

IT214_DATABASE MANAGEMENT SYSTEMS_LA_SE... MEDIUM

Q. *Explain the statement:*

The Canonical Cover for given sets of R and F is not unique.

IT214_DATABASE MANAGEMENT SYSTEMS_LA_SE... MEDIUM

Q. Explain the significance of **Closure of Set of Functional Dependencies** using appropriate example.

IT214_DATABASE MANAGEMENT SYSTEMS_LA_SE... MEDIUM

Q. Explain the purpose of **Canonical Cover of Set of Functional Dependencies** in the context of the database design.

IT214_DATABASE MANAGEMENT SYSTEMS_LA_SE... MEDIUM

IT214_Database Management Syst... ✔ Total (4) Easy (0) Medium (4) Difficult (0)

Q. There are four transactions T1, T2, T3 and T4 with TS(T1)<TS(T2)<TS(T3)<TS(T4).

a) In a situation where T2 is waiting for T1, T3 waiting for T2, T4 waiting for T1, answer the following:

i. The number of transactions that would be rolled back in wait-die scheme
ii. The number of transactions that would be rolled back in wound-wait scheme
iii. The transaction that would get executed first in the wait-die scheme
iv. The transaction which would get executed first in the wound-wait scheme

b) In a situation where T1 is waiting for T2, T2 waiting for T3, T1 waiting for T4, answer the following:

i. The number of transactions that would be rolled back in wait-die scheme
ii. The number of transactions that would be rolled back in wound-wait scheme
iii. The transaction that would get executed first in the wait-die scheme
iv. The transaction which would get executed first in the wound-wait scheme

IT214_DATABASE MANAGEMENT SYSTEMS_PART 2... MEDIUM

Q. Transaction T1 adds 500 to the value of the database elements A, B, C. Transaction T2 doubles the value of the database element A, B, C. T3 multiplies the value of the database elements A, B, C by 10. Consider the following interleaved schedule S of committed transactions T1, T2, and T3.

S: R1(A), W1(A), R2(A),W2(A),R2(B), W2(B), R3(C), R2(C), W2(C), W3(C), R1(B), W1(B)

Note: R and W are Read and Write actions of the transactions T1, T2, and T3.

Answer the following questions considering that values of A,B,C equal to 25 each at time t=0.

a. What is the result (values A, B, C) of interleaved schedule S?

b. Is the schedule **S** serializable? Justify your answer.

c. Create a new schedule **S1** by applying **Strict 2PL** to **S**, what is the result (values A, B, C) of the schedule **S1**?

d. Is the resulting schedule **S1** Serializable? Justify your answer.

IT214_DATABASE MANAGEMENT SYSTEMS_PART 2... MEDIUM

Q. Consider a movie database having a relation:

Movie (title, year, film type, length, producer name, star name, producer address)

There are no 2 movies made with the same **title** in the same **year**. The films can be b/w, colour, Fuji colour and is represented using attribute **film type.** Every movie casts several **stars** but is produced by a single production house. The production house has been represented by a **'producer name'** and the address of the production house by the **producer address**. The following FDs have been **suggested**:

i. title, year --> length, film type, producer name
ii. title, year --> star name
iii. star name, year --> title
iv. producer name ---> producer address
v. title, star name ----> year, film type, producer name

Answer the following questions considering that values of A,B,C equal to 25 each at time t=0.

a. What is the result (values A, B, C) of interleaved schedule S?

b. Is the schedule **S** serializable? Justify your answer.

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IT214_DATABASE MANAGEMENT SYSTEMS_PART 2... MEDIUM

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i. title, year --> length, film type, producer name
ii. title, year --> star name
iii. star name, year --> title
iv. producer name ---> producer address
v. title, star name ----> year, film type, producer name

a. State the primary key for the relation **Movie**

b. Clearly indicate the FDs that you want to retain from the **suggested** list of FDs, because you think that they are natural outcome of the logic of the given problem domain (Justifying your choice of FDs)

c. List existing Insert\update/delete anomalies for the relation **Movie**

d. Normalize the database till 3NF step by step (1NF, 2NF, 3NF)

IT214_DATABASE MANAGEMENT SYSTEMS_PART 2... MEDIUM

Q. Consider relation **R = (A, B, C, D)** and Functional Dependency Set **F = (AB→C, C→D, D →A)**

a. Calculate closure of set of attribute **(BC)+** using the Closure of Set of Attributes pseudo code. (Note: you must mention (iteration number, result of the iteration, reasoning) for each iteration of the Closure of Set of Attributes pseudo code)

b. Explain/ Demonstrate the significance of Closure of Set of Attributes for a relation clearly (using given set **R** and **F**).

IT214_DATABASE MANAGEMENT SYSTEMS_PART 2... MEDIUM

IT214_Database Management Syst... ✔ Total (1) Easy (1) Medium (0) Difficult (0)

Q. The Advanced Engineers Training Systems (AETS) needs to build an access control system for its building. The space to be protected is divided over 4 floors of a building. The building is divided into five areas: two research wings, an experiment wing, an administration wing, and a central section which contains few classrooms and 6 lecture halls. The site accommodates about 5000 people every day: not only students, but also instructors, researchers, administrative and technical staff, as well as numerous visitors. After various items of property started disappearing, it was decided to restrict access to some of the rooms using doors with automatic locking. The opening of each door is controlled by a card reader, located nearby. The cards allowing the opening of these doors are only given to the people who need to access restricted areas in order to perform their duties. Access rights are distributed among groups of people and groups of doors. Each person and each door must always belong to a group.A group of doors may consist of doors distributed throughout the building, but from the point of view of controlling access, only the concept of a group of doors is important - routes and movement are not controlled. However, a given door cannot be a member of more than one group of doors. A given person, on the other hand, may be 'a member of several groups, so that his access rights correspond to the combined rights of each of the groups he belongs to. The state, duration or privacy level are some of the important parameters of the door.

Access rights are established by describing, for each group of people, the various groups of doors that are accessible and under what time constraints. These rights are contained in a yearly calendar that describes the schedule for a week at a time. Given that there will be a small variation of rights over time; a calendar may be initialized using 'typical' weeks that describe a fixed configuration of rights. The supervisor may create as many 'typical' weeks as he wishes, and any subsequent changes made will automatically be propagated to all the calendars using them. On the other hand, changes made to a calendar directly - to take vacation days into consideration, for example - are not affected by the modification of a 'typical' week. The information about a typical week is represented in the form of a table. The grayed areas correspond to time periods during which access is not authorized. The table shows access allowed for specific time duration for each weekday. The access control system must operate as autonomously as possible, although a supervisor is responsible for

small variation of rights over time; a calendar may be initialized using 'typical' weeks that describe a fixed configuration of rights. The supervisor may create as many 'typical' weeks as he wishes, and any subsequent changes made will automatically be propagated to all the calendars using them. On the other hand, changes made to a calendar directly - to take vacation days into consideration, for example - are not affected by the modification of a 'typical' week. The information about a typical week is represented in the form of a table. The grayed areas correspond to time periods during which access is not authorized. The table shows access allowed for specific time duration for each weekday. The access control system must operate as autonomously as possible, although a supervisor is responsible for the initial configuration and the updating of the various pieces of information that define the groups of people and doors. A guard has a control screen, and is informed of any unsuccessful entry attempts. Alarms are transmitted with a slight delay: information update on the control screen is performed promptly. The user interface must help the users to specify their requests correctly. Legal requests and input values are systematically read from lists that define the domain of correct values.

Design a database for the system described above. For designing the database you need to follow the steps:

a. **Write refined Problem Description**
b. **Extract Requirements, Assumptions and Constraints**
c. **Identify all the Relations & Schemas with all details**
d. **Identify Functional Dependencies**
e. **Normalize the database up to 3NF/BCNF**

Note:

- ***The normalization process should be clearly illustrated /demonstrated with associated logic***

IT214_DATABASE MANAGEMENT SYSTEMS_RE EASY