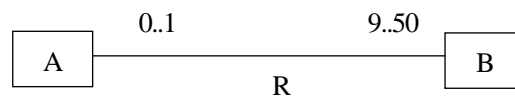


一、Multiple Choices. (Total marks: 20)

1. With respect to DBS design, the index is designed at the () phase.

- (A) requirement analysis
- (B) conceptual design
- (C) logical design
- (D) physical design

2. For the E-R diagram given below, the mapping cardinality from A to B is () .



- (A) one-to-many
- (B) one-to-one
- (C) many-to-one
- (D) many-to-many

3. The following SQL statement corresponds to the expression () .

Select *

From r, s

- (A) $r \cap s$
- (B) $r \infty s$
- (C) $r \times s$
- (D) $r - s$

4. Given the schema $R(A, B, C, D, E, F)$ and the functional dependencies $F=\{AB \rightarrow D, BC \rightarrow E, D \rightarrow F, AB \rightarrow F, CE \rightarrow B\}$ holding on it, () is a transitive functional dependency.

- (A) $AB \rightarrow D$
- (B) $BC \rightarrow E$

(C) $D \rightarrow F$

(D) $AB \rightarrow F$

5. The properties of a transaction are () .

(A) Atomicity

(B) Consistency

(C) Isolation

(D) Durability

6. In a Select statement, () can be used to take out repetition tuples.

(A) unique

(B) count

(C) distinct

(D) union

7. Given a relation $r(R)$, which one of the following functional dependencies is satisfied by r .

()

A	B	C
1	6	2
4	5	6
4	6	6
7	3	8
9	1	0

(A) $A \rightarrow B$

(B) $AC \rightarrow B$

(C) $BC \rightarrow A$

(D) $B \rightarrow C$

8. Given the schema $R(A, B, C, D)$ and the functional dependencies $\{A \rightarrow B, A \rightarrow C, A \rightarrow D, (B, C) \rightarrow A\}$ holding on it, the candidate key(s) is /are ()
- (A) A
 - (B) B
 - (C) (B,C)
 - (D) (A,B,C)
9. The SQL State to remove a view salary is ()
- (A) DROP salary VIEW
 - (B) DROP VIEW salary
 - (C) DELETE salary VIEW
 - (D) DELETE salary
10. Which describes the isolation property of a transaction? ()
- (A) Partial effects of incomplete transactions should not be visible to other transactions
 - (B) Effects of a committed transaction are permanent and must not be lost because of later failure
 - (C) A transaction is either performed in its entirety or not performed at all.
 - (D) A transaction must transform database from one consistent state to another.

二、Relational Algebra. (Total marks: 15)

Consider the relational database in the following:

employee (person-name, street, city)

works (person-name, company-name, salary)

company (company-name, city)

manages (person-name, manager-name)

where the primary keys are underlined.

Give an expression in the relational algebra to express each of the following queries:

1. Find the names of all employees who work for Atget Bank Corporation. (Marks: 5)
2. Find the names, street address, and cities of residence of all employees who work for Atget Bank Corporation and earn more than \$10,000 per annum. (Marks: 5)
3. Find the names of all employees in this database who live in the same city as the company for which they work. (Marks: 5)

三、SQL statements. (Total marks: 20)

Salesperson

ID	Name	Age	Salary
1	Abe	61	140000
2	Bob	34	44000
5	Chris	34	40000
7	Dan	41	52000
8	Ken	57	115000
11	Joe	38	38000

Customer

ID	Name	City	Industry Type
4	Samsonic	pleasant	J
6	Panasung	oaktown	J
7	Samony	jackson	B
9	Orange	Jackson	B

Orders

Number	order_date	cust_id	salesperson_id	Amount
10	8/2/96	4	2	540
20	1/30/99	4	8	1800
30	7/14/95	9	1	460
40	1/29/98	7	2	2400
50	2/3/98	6	7	600
60	3/2/98	6	7	720
70	5/6/98	9	7	150

Write SQL statements based on the tables above:

- (1) Find the names of all salespeople that have an order with Samsonic. (Marks: 4)
- (2) Find the names of all salespeople that do not have any orders with Samsonic. (Marks: 6)
- (3) Find the names of salespeople that have 2 or more orders. (Marks: 5)
- (4) Write a SQL statement to insert rows into a table called highAchiever(Name, Age), where a salesperson must have a salary of 100,000 or greater to be included in the table. (Marks: 5)

四、Normalization. (Total marks: 25)

employeeNo	employeeName	age	sex	departmentNo	departmentName
E1	Jackson	20	F	D3	Development Department
E2	Peters	25	M	D1	Finance Department
E3	Smith	38	M	D3	Development Department
E4	Stevens	25	F	D3	Development Department

1. Which normal form is the relation shown above in? Why? (Marks: 3)

2. Whether is the table shown above subsection to update anomalies or not? If yes, please provide examples. (Marks: 8)
3. If the relation is not in 3NF, bring it to 3NF relations; specify primary keys and referential integrity constraints, using directed arcs, for each relation. (Marks: 6)
4. How does the decomposition of the relations solve the problem may exist in the original relations? (Marks: 8)

五、Database Design (Total marks: 20)

Consider the management system below.

- Fair Records company needs to store information about songs, albums and musicians who perform on its albums in a database.
- Each musician that records at company has an Id (which is unique), a name, an address, and a phone number.
- Each instrument used in company has a name and an ID, ID is unique.
- Each album recorded on the Fair label has a title, a copyright date, a format, and an album identifier.
- Each song recorded at Fair has a title and an author, and each song can be identified by title.
- Each musician may play several instruments, and a given instruments may be played by several musicians.
- Each album has a number of songs on it, but no song may appear on more than one album.
- Each song is performed by one or more musicians, and a musician may perform a number of songs.
- Each album has exactly one musician who acts as its producer. A musician may produce several albums, of course.

(1) Design the E/R diagram for hospital database on basis of the information mentioned above.

(Marks: 10)

Note: mapping cardinality of each relationship and participation of each entity to the relationship should be described in the diagram.

(2) Convert the E-R diagram to 3NF relations, and give the primary keys of each relation schemas and referential integrity constraints, using directed arcs. (Marks: 10)