四川大学期末考试试题（闭卷）

（2015~2016 学年第 2 学期）

课程号：**311038040** 课程名称：**数据库系统（A 卷）** 任课教师：**张天庆、龚勋、李川、屈立笳**

适用专业年级：**软件工程 2014 级** 学号：_____ 姓名：_____

考试须知

四川大学学生参加由学校组织或由学校承办的各级各类考试，必须严格执行《四川大学考试工作管理办法》和《四川大学考场规则》。有考试违纪作弊行为的，一律按照《四川大学学生考试违纪作弊处罚条例》进行处理。

四川大学各级各类考试的监考人员，必须严格执行《四川大学考试工作管理办法》、《四川大学考场规则》和《四川大学监考人员职责》。有违反学校有关规定的，严格按照《四川大学教学事故认定及处理办法》进行处理。

题　　号	1	2	3	4	5				卷面成绩
得　　分									
阅卷时间									

注意事项：1. 请务必将本人所在学院、姓名、学号、任课教师姓名等信息准确填写在试题纸、答题纸和添卷纸上；

2. **请将答案全部填写在答题纸上；**

3. 考试结束，请将试题纸、答题纸、添卷纸和草稿纸一并交给监考老师。

评阅教师	本题得分

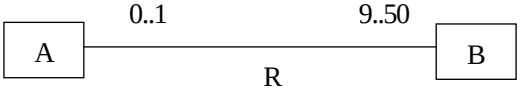
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

1. Multiple Choices. (Total marks: 20)

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



A. one-to-many　　B. one-to-one　　C. many-to-one　　D. many-to-many

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

Select　*

From　r, s

A. r ∩ s　　B. r ∞ s　　C. r ╳ s　　D. r — s

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

A. AB→D　　B. BC→E　　C. D →F　　D. AB→F

(5) The properties of a transaction are (　A B C D　).

A. Atomicity　　B. Consistency　　C. Isolation　　D. Durability

(6) In a Select statement, (　C　) 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. (　C　)

A. A→B　　B. AC→B　　C. BC→A　　D. B→C

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

(8) Given the schema R(A，B，C，D) and the functional dependencies {A→B，A→C，A→D，(B，C）→A} holding on it, the candidate key(s) is /are (　A　C　).

A. A　　B. B　　C. (B,C)　　D. (A,B,C)

(9) The SQL State to remove a view salary is (　B　).

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　)

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.

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评阅教师	本题得分

2. 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)**

参考答案:

1) $\Pi_{\text{person-name}}(\sigma_{\text{company-name}=\text{“Atget Bank Corporation”}}(\text{works}))$

2) $\Pi_{\text{person-name, street, city}}(\sigma_{(\text{company-name}=\text{“Atget Bank Corporation”} \wedge \text{salary}>10000)}\text{works} \times \text{employee})$

3) $\Pi_{\text{person-name}}(\text{employee} \times \text{works} \times \text{company})$

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3. 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)**

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参考答案：

1、

答案 1：

```
select   Salesperson.Name
from     Salesperson, Orders
where    Salesperson.ID = Orders.salesperson_id
          and    cust_id = '4';
```

答案 2：

```
select   Salesperson.Name
from     Salesperson
where    Salesperson.ID =  （select Orders.salesperson_id
                            from Orders, Customer
                                 where Orders.cust_id = Customer.id and Customer.name = 'Samsonic）;
```

2、

```
select   Salesperson.Name
from     Salesperson
where    Salesperson.ID   NOT   IN   (select     Orders.salesperson_id
                                      from     Orders, Customer
                                      where    Orders.cust_id = Customer.ID
                                           and    Customer.Name = 'Samsonic')
```

3、

```
SELECT      name
FROM        Orders, Salesperson
WHERE       Orders.salesperson_id = Salesperson.id
GROUP BY    name, salesperson_id
HAVING      COUNT( salesperson_id ) >1
```

4、

```
insert into   highAchiever (name, age)
 (select   name, age
           from    salesperson
           where salary > 100000);
```

或

```
insert into highAchiever(name, age)
values ('Jackson', 28)
```

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评阅教师	本题得分

4. 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)**

参考答案：

（1）关系 R 是 2NF

（2）存在插入，删除异常：

当插入一个新部门，而该部门还没有员工时，不能加入，从而发生插入异常；

当某部门只有一名员工，删除该员工时会把该部门的信息也删除，从而发生删除异常。

原因在于非主属性“部门名称”对码“职工号”存在传递函数依赖。

（3）分解为两个关系，使之达到 3NF；

职工（职工号，职工名，年龄，性别，部门号）

部门（部门号，部门名称）

（4）分解后的关系可以避免上述操作异常问题。

当增加一个新部门，而该部门还没有员工时，仍然可以向部门关系中加入该部门信息，从而解决了插入异常问题。

当某部门只有一名员工，删除该员工时，直接删除职工关系中的该行信息即可。 不再会把该部门的信息也删除，从而解决了删除异常的问题。

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评阅教师	本题得分

5. 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)**

参考答案:

(1)

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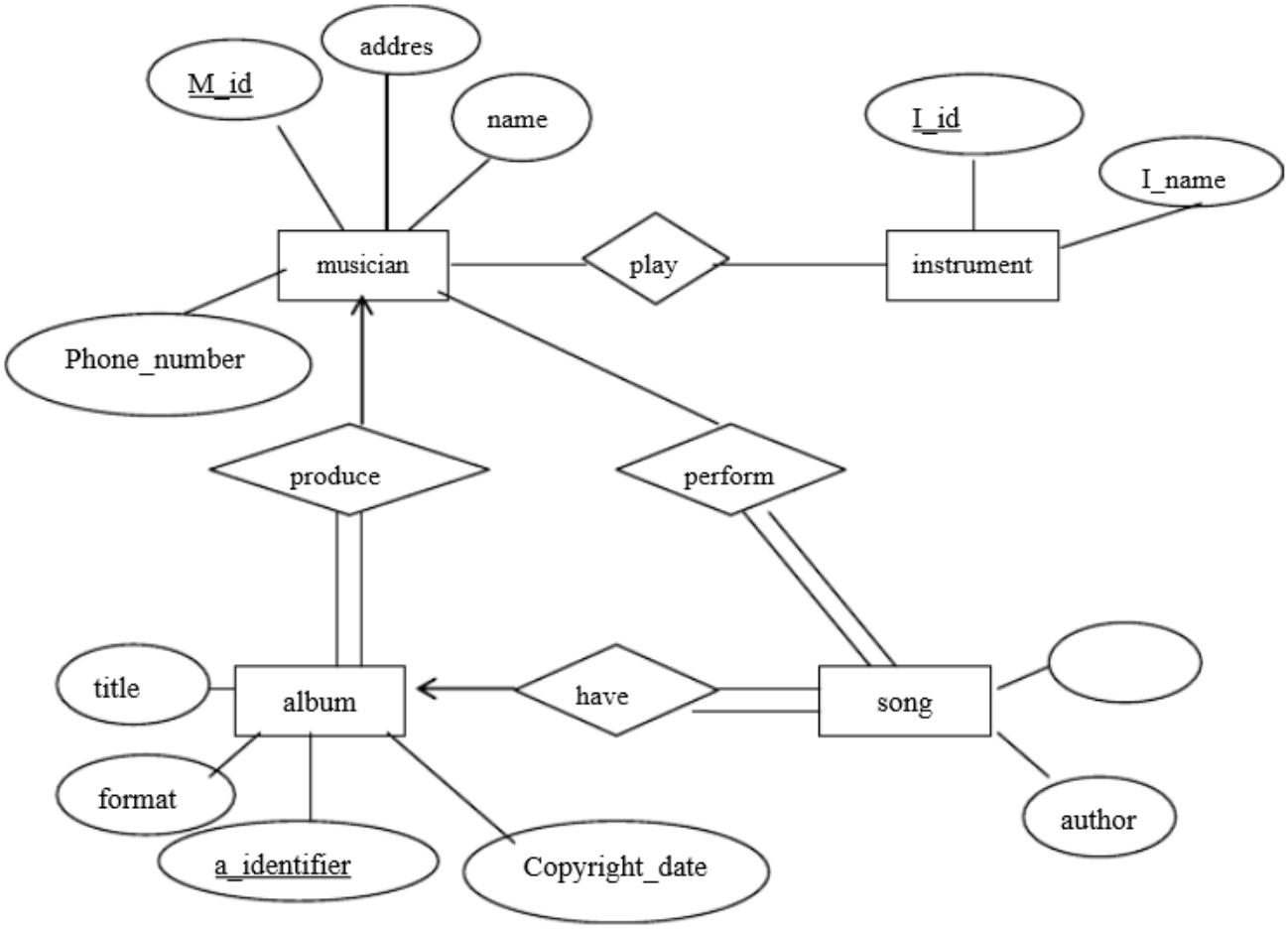

全参与和部分参与可有不同答案。

(2)

musician (m_id, name, address, phone_number)

instrument (I_id,I_name)

album (a_identifier, title, copyright_date, format, m_id)

song (s_title, author, a_identifier)

外部关键字 play (m_id, I_id) 外部关键字

perform (m_id, s_title)

外部关键字

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