※ 考生請注意：本試題不可使用計算機

一 選擇題（30%）

1）Assume there are two relations R and S, R-(R-S) represents

　　A.　R ∩ S

　　B.　R ∪ S

　　C.　R - S

　　D.　R × S

2）We use GROUP BY clause in SQL to partition tuples into groups. If we want every resulting group to satisfy certain condition, which SQL clause is needed?

　　A. SATISFY

　　B. SUCH THAT

　　C. HAVING

　　D. WITH

3）Which of the following relational algebra operators is especially useful to express the following kinds of queries: Find the names of students who have taken all courses offered by Professor Lee?

　　A.　Union

　　B.　Join

　　C.　Selection

　　D.　Division

4）In database theory, a(n) _____ is a virtual or logical table composed of the result set of a query.

　　A.　partition

　　B.　view

　　C.　abstraction

　　D.　None of the above

5）A relation is first normal form if

　　A.　the relation contains no foreign key.

　　B.　the relation contains no multi-valued attributes.

　　C.　the relation contains the same number of rows and columns.

　　D.　none of the above

6）Which of the following is not a potential problem caused by multiple transactions manipulating a database at the same time?

　　A. Lost update problem

　　B. Incorrect summary problem

　　C. Deadlock

　　D. Clustering

（背面仍有題目，請繼續作答）

※ 考生請注意:本試題不可使用計算機

7) Consider relation R(A,B) and S(B,C) where T(R)=5000, T(S)=3000, and B is a primary key on S. The expected number of tuples in R×S is

    A. less than or equal to 3000

    B. less than or equal to 5000

    C. greater than 3000

    D. none of above

8) Entity-relationship model is used in the _____ stage of information systems development, including database development.
    A. feasibility study
    B. design
    C. requirement analysis
    D. implementation

9) Which of the following index is a file with pairs of keys and pointers for every record in the data file?
    A. Dense index
    B. Bitmap index
    C. Secondary index
    D. Sparse index

10) Assume an organization where every employee is working for only one department, and where each department is located at exactly one location.

The database of this organization contains the following table:

EMPLOYEE(empName, department, location). Which of the following is true?

    A. No, it is not in BCNF and should be decomposed into　　EMPLOYEE(empName) and DEPT(department, location)

    B. Yes, it is BCNF

    C. No, it is not in BCNF and should be decomposed into EMPLOYEE(empName, department) and DEPT(department, location)

    D. No, it is not in BCNF and should be decomposed into EMPLOYEE(empName, department, location) and DEPT(department, location)

※ 考生請注意：本試題不可使用計算機

二 For each of the terms in the left-hand column below, select the term in the right-hand column that best matches it. (20%)

1. _____ Fan-out

A. A kind of page replacement policy

2. _____ Concurrency control

B. A field in one record pointing to a key field of another record

3. _____ LRU

C. Number of children for a non-leaf node.

4. _____ Integrity constraints

D. A popular concurrency control protocol

5. _____ Two-phase locking

E. An entity set may not have sufficient attributes to form a primary key, and its primary key compromises of its partial key and primary key of its parent entity

6. _____ Foreign key

F. Rules used to guard against database errors due to performing transactions simultaneously

7. _____ ACID

G. Requirements that must hold for data in the database to be correct

8. _____ Weak Entity set

H. A disproportionate number of keys happen to hash to the same bucket

9. _____ Access path

I. A set of properties that guarantee that database transactions are processed reliably

10. _____ Clustering

J. A way of retrieving tuples from a table and consists of either (1) a file scan or (2) an index plus a matching selection condition

三 問答題

1. Describe each of the following terms: A. index ;　B. data model;　C. Index-only evaluation;　D. Selection operator in relational algebra;　E. DML Compiler. (15%)

（背面仍有題目，請繼續作答）

系所組別：會計學系乙組

考試科目：資料庫管理系統　　　　　　　　　　　　　　　　　考試日期：0224，節次：1

※ 考生請注意：本試題不可使用計算機

2. Enumerate the three kinds of anomalies (redundancy anomaly, update anomaly, deletion anomaly) that can occur when too much is crammed into a single relation, and illustrate each with respect to the following relation.　(14%)

employeeSSN	dept#	DeptPhone
20120101	Manufacture	63642
20120101	Engineering	63646
20120212	Manufacture	63642

3. Consider a database schema with the following relations:

    Student (ssn, name)

    Prof (ssn,name)

    Course (number, instructor_ssn, title, credits, room_no)

    Enrol l(student_ssn,course_number)

    a. Write an SQL query that finds the names of all students who are enrolled in a class taught by "Jones" (6%)

    b. Write an SQL query that finds the names of all students who are not enrolled in classes held room 333.　(5%)

    c. Describe the relations that would be produced by the following relational algebra operations: (10%)

        i.　$\Pi_{number} (\sigma_{credits > 5} (Course))$

        ii.　$\sigma_{Prof.ssn = Course.instructor\_ssn} (Prof \times Course)$