國 立 臺 北 科 技 大 學

九十八學年第二學期電機系博士班資格考試

資料庫 試題

```
┌──┬──┬──┬──┬──┬──┐
│  │  │  │  │  │  │
└──┴──┴──┴──┴──┴──┘
```

注意事項：

1. 本試題共【7】題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在試卷答案欄內，否則不予計分。
4. 考試時間：二小時。

1. Consider the following tables T1 and T2. Show the results of the following operations:
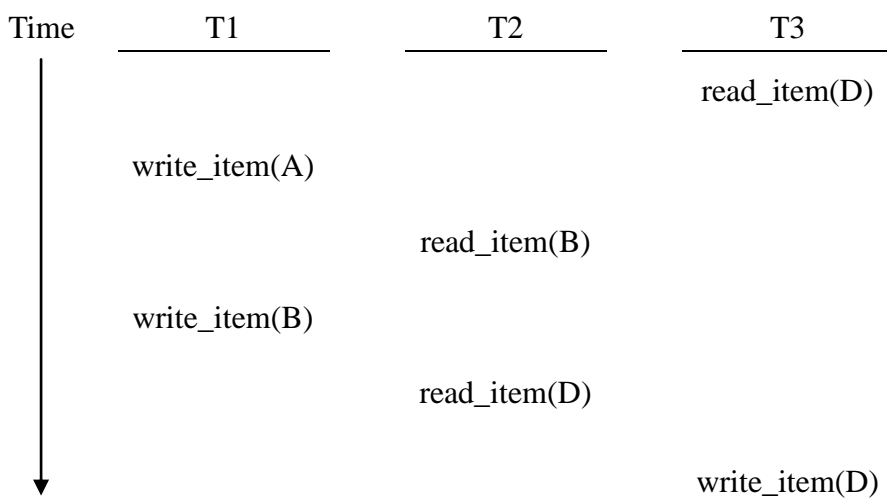
Table T1		
P	Q	R
5	a	1
10	b	2
10	a	3
15	b	4

Table T2		
A	B	C
10	b	5
15	a	6
15	b	7
20	a	8

(a) (*5 points*) T1 ⋈$_{T1.P=T2.A}$ T2   (⋈: join operation)

(b) (*5 points*) T1 ⟕$_{T1.P=T2.A}$ T2   (⟕: left outer join operation)

(c) (*5 points*) T1 ⟗$_{T1.P=T2.A}$ T2   (⟗: full outer join operation)

(d) (*6 points*)　SELECT　　　Q, SUM(T1.R) AS S
　　　　　　　　　FROM　　　　T1
　　　　　　　　　GROUP BY　　T1.Q

(e) (*6 points*)　SELECT　　　*
　　　　　　　　　FROM　　　　T1
　　　　　　　　　WHERE NOT EXISTS (SELECT　　　*
　　　　　　　　　　　　　　　　　　FROM　　　　T2
　　　　　　　　　　　　　　　　　　WHERE　　　T1.P=T2.A)

2. (*10 points*) How to identify a weak entity?

3. (*10 points*) Why the tuples in a relation are not ordered?

4. Consider a relation R (A, B, C, D) with the following dependencies:

$$AB \rightarrow C, C \rightarrow A, C \rightarrow D.$$

(a) (*5 points*) Identify all of the (minimal) candidate keys for R.

(b) (*5 points*) Is relation R in 2NF, 3NF, BCNF? Why or why not?

5. Consider the following transaction schedule:

Time	T1	T2	T3
			read_item(D)
	write_item(A)		
		read_item(B)	
	write_item(B)		
		read_item(D)	
			write_item(D)

(a) (*6 points*) Is the schedule conflict serializable? Prove your answer. If it is conflict serializable, give an equivalent serial order for the transactions.

(b) (*6 points*) Can you insert a series of read-lock/write-lock/unlock operations so as to make the schedule **2PL**? If so, show the resulting schedule. If not, why not?

(c) (*6 points*) Can you insert a series of read-lock/write-lock/unlock operations so as to make the schedule **strict 2PL**? If so, show the resulting schedule. If not, why not?

6. (*10 points*) Discuss the techniques for allocating file blocks on disk.

7. (a) (*5 points*) What is ISAM (Indexed Sequential Access Method)?

(b) (*5 points*) What is B+-tree?

(c) (*5 points*) What are the advantages of the B+-tree over the ISAM?