

臺中健康暨管理學院九十一學年度碩士班暨碩士在職專班招生考試試題紙

系 所 別	組 別	考試科目	考試日期	時 間	備 註
生物資訊研究所碩士班		資料庫系統	4月7日	10:30 ~ 12:10	共二頁

- I. For each of the questions in this problem set, you are to mark T for true, F for false. (15%)
1. Participation of a weak entity in the corresponding weak relationship must be total, but the participation of the strong entity may or may not be total.
  2. Every ER diagram can be converted into an equivalent relational schema.
  3. A relational algebra query containing selections, projection, Cartesian products, and joins can be converted into an equivalent relational algebra query containing only selections and Cartesian products.
  4. Each ternary relationship in an ER diagram can be represented using only binary relationships.
  5. Let  $R(a, b)$  and  $S(a, b)$  be two relations,  $\pi_a(R-S) = (\pi_a(R) - \pi_a(S))$ .

- II. For each of the questions below, you are to circle the most restrictive correct answer, and fill in the blank of the fifth question with appropriate answer. (15%)
1. The running time for equality search with selection on a sorted file when search is made on the sort key is:
    - a. Linear on the number of pages but logarithmic on the number of records per page.
    - b. Linear on the number of pages and linear on the number of records per page.
    - c. Logarithmic on the number of pages but linear on the number of records per page.
    - d. Logarithmic on the number of pages and logarithmic on the number of records per page.
  2. Sparse indexing can be used only if
    - a. Clustered indexing is possible.
    - b. File is sorted on the search key of the index.
    - c. The actual data record as the data entry is used.
    - d. The file is a hashed one.
  3. A data file is said to be inverted on a field if
    - a. There is a sparse secondary index on every other field.
    - b. There is a primary index with opposite order on that field.
    - c. There is a dense secondary index on that field.
    - d. There is a sparse clustered index on that field.
  4. Consider the following ER diagram.
    - a. Instance 1 does not violate any constraints, but instance 2 does.
    - b. Instance 1 violates some constraints, but instance 2 does not.
    - c. Both instance 1 and 2 do not violate any constraints.
    - d. Both instance 1 and 2 violate some constraints.



Instance 1	Entity set A = {a1, a2, a3} Entity set B = {b1, b2, b3} Relationship set R = {(a1, b1), (a2, b2), (a2, b3)}
Instance 2	Entity set A = {a1, a2} Entity set B = {b1, b2, b3} Relationship set R = {(a1, b2), (a2, b1)}

5. If the number of primary leaf page in an ISAM tree is  $N$  and the fan-out is  $F$ , the number of disk I/Os required to access a leaf is \_\_\_\_\_.

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III. Suppose we have a relation ABCDE with the functional dependencies: (20%)

$$F = \{AB \rightarrow D, C \rightarrow E, DE \rightarrow A, D \rightarrow C\}$$

1. Is the following a valid instance of the relation ABCDE under  $F$ ?

A	B	C	D	E
1	3	3	1	3
2	1	2	3	2
2	2	4	3	2
3	1	1	2	4

- Find all candidate keys for the relation.
- Is the functional dependency  $BCE \rightarrow ACE$  in  $F^+$ ? Explain it.

IV. Consider the following schema. The key fields are underlined, and the domain of each field is listed after the field name. Write a query in relational algebra and SQL to find the *sids* of suppliers who supply some red part or are at 221 Packer Ave. (20%)

Suppliers(sid: integer, *sname*: string, *address*: string)

Parts(pid: integer, *pname*: string, *color*: string)

Catalog(sid: integer, pid: integer, *cost*: real)

V. Which of the three basic file organizations would you choose for a file where the most frequent operations are as follows? (10%)

- Search for records based on a range of field values.
- Perform inserts and scans where the order of records does not matter.
- Search for a record based on a particular field value.

VI. Consider the following schedule: (20%)

	Transaction $T_1$	Transaction $T_2$	Transaction $T_3$
Time ↓		R(Z) R(Y) W(Y)	
	R(X) W(X)		R(Y) R(Z)
		R(X)	W(Y) W(Z)
	R(Y) W(Y)	W(X)	

- Draw the precedence (serialization) graph.
- Show the equivalent serial schedule. If it does not exist, explain the reason.