

國立臺灣科技大學

九十二學年度博士班招生考試試題

系所組別：資訊管理系博士班甲組

科目：資訊系統

題目共 7 題，總分 100 分

1. (15%) Consider the following log for four transactions T1, T2, T3, and T4 at the point of system crash. Suppose we use the immediate update protocol with checkpointing. Describe the recovery process from the system crash. Specify which transactions are rolled back, which operations in the log are redone and which (if any) are undone, and whether any cascading rollback takes place.

```

[start_transaction, T1]
[read_item, T1, A]
[read_item, T1, D]
[write_item, T1, D, 20]
[commit, T1]
[checkpoint]
[start_transaction, T2]
[read_item, T2, B]
[write_item, T2, B, 12]
[start_transaction, T4]
[read_item, T4, D]
[write_item, T4, D, 15]
[start_transaction, T3]
[write_item, T3, C, 30]
[read_item, T4, A]
[write_item, T4, A, 20]
[commit, T4]
[read_item, T2, D]
[write_item, T2, D, 25] ← system crash

```

2. (15%) Given the following sequence of Keys, construct an order 3 B+-tree; then delete the following set of keys (in the given sequence) and list the final B+-tree.

3, 15, 84, 7, 34, 56, 38, 19, 66, 74, 21, 100, 35

delete sequence 34, 38, 15, 21

3. (20%) Consider the following relation REFRIG(Model#, Year, Price, Manu_Plant, Color), which is abbreviated as REFRIG(M,Y,P,MP,C), and with the following set F of functional dependencies: $F = \{M \rightarrow MP, \{M, Y\} \rightarrow P, MP \rightarrow C\}$
- Evaluate each of the following as a candidate key for REFRIG, given reasons why it can or cannot be a key: $\{M\}$, $\{M, Y\}$, $\{M, C\}$.
 - Based on the above key determination, state whether the relation REFRIG is in 3NF and in BCNF, giving proper reasons.
 - Consider the decomposition of REFRIG into $D = \{R1(M, Y, P), R2(M, MP, C)\}$. Is this decomposition lossless? Show why.



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4. (12%) Describe “Web Services”.
5. (12%) Two common techniques used in routing protocols are “Link State” routing and “Distance Vector” routing. First describe them individually and then compare them by showing their advantages and disadvantages.
6. (13%) Describe the standard 802.11 from the directions of physical layer, architecture, frame structure, and MAC.
7. (13%) To provide some degree of Quality of Services (QoS), “Integrated Services” and “Differentiated Services” were developed. First describe them individually and then compare them by showing their advantages and disadvantages.

