考 試 科 目	計算機概論	系 所 別	資訊管理學系/資管組	考 試 時 間	2月3日(五) 第2節

I. Multiple Choice (40%, 5 points for each)

1. An OS may put resource restrictions on processes to prevent ____; however, if an OS puts too many restrictions, ____ may occur.

   a. starvation, deadlock

   b. deadlock, starvation

   c. segmentation, paging

   d. paging, segmentation

2. Swapping in OS, multiprogramming with swapping is called ____; whereas multiprogramming without swapping is called ____.

   a. partitioning, demand paging

   b. demand segmentation, framing

   c. demand paging, partitioning

   d. framing, demand segmentation

3. In the ____ key method, ____ key is publicly known.

   a. asymmetric, decryption

   b. symmetric, decryption

   c. asymmetric, encryption

   d. symmetric, encryption

4. In the TCP/IP protocol, ____ layer is responsible for node-to-node delivery; whereas ____ layer is responsible for source-to-destination delivery.

   a. session, data link

   b. application, transport

   c. network, session

   d. data link, network

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5. Given the following expression tree, convert it to the Prefix and Postfix notations.
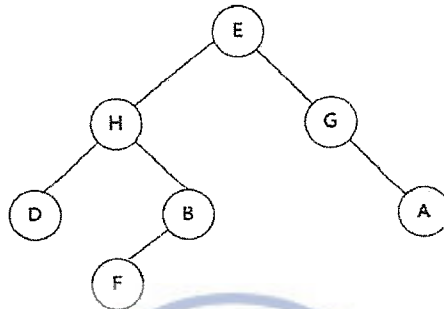
   a. Prefix: DFBHAGE; Postfix: EHDBFGA

   b. Prefix: FDBHAGE; Postfix: AGEFBDH

   c. Prefix: AGEFBDH; Postfix: FDBHAGE

   d. Prefix: EHDBFGA; Postfix: DFBHAGE

6. What is the maximum and minimum number of nodes in a balanced AVL tree of height 4?

   a. Max= 31; Min= 11

   b. Max= 30; Min= 12

   c. Max= 31; Min= 12

   d. Max= 30; Min= 11

7. The worst complexity of a selection sort is _____, and the worst complexity of a merge sort is _____.

   a. $O(n^2)$; $O(n*\log n)$

   b. $O(n*\log n)$; $O(n^2)$

   c. $O(n^2)$; $O(\log n)$

   d. $O(n^2*\log n)$; $O(\log n)$

8. Which of the following statement is NOT true?

   a. SQL databases are vertically scalable; whereas NoSQL databases are horizontally scalable.

   b. Table-based databases is the major type of SQL databases; whereas both document-based and key-value are the types of noSQL databases.

   c. SQL databases is relational databases; whereas NoSQL is non-relational databases.

   d. SQL databases are built to store data without a predefined schema; whereas NoSQL databases are best suited for complex queries.

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II. Answer the following questions (60%)

1. What is the output most likely to derive from the following code segment? (10%)

```java
public class Main {
    public static void main(String[] args) {
        int result = sum(5, 15);
        System.out.println(result);
    }
    public static int sum(int input, int tmp) {
        if (tmp >= input) {
            return tmp + sum(input, tmp - 5);
        } else {
            System.out.println(tmp);
            return tmp;
        }
    }
}
```

2. A relation R has three attributes abc. Given each of the following functional dependencies, what is the candidate key(s) for R? (15%)

    (1). $a \rightarrow b$, $a \rightarrow c$

    (2). $c \rightarrow a$

    (3). $bca \rightarrow a$, $a \rightarrow b$

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3. Briefly explain the differences between supervised and unsupervised learning in machine learning. Based on the following metrics in the table, put a mark (V) on the cell if the model type is a form of supervised/unsupervised learning. (35%)

	Supervised Learning	Unsupervised Learning
Classification		
Clustering		
Dimensionality Reduction		
K-means		
KNN		
Regression		
SVM		

| 備　　　註 | 一、作答於試題上者，不予計分。
二、試題請隨卷繳交。 |