

科目： 計算機概論

系所組：資訊工程研究所

1. (30%) True/False (是非題, 每題 2 分)

- (1) The control unit and the arithmetic/logic unit are both part of the central processing unit (CPU).
- (2) Both RAM and ROM are random-access devices.
- (3) Because timesharing relates to mainframe use, it is not relevant to modern computing.
- (4) The first-come, first-served (FCFS) CPU scheduling algorithm is a preemptive approach.
- (5) Direct access files must be read from the beginning to the end.
- (6) A file system is the logical view of secondary memory that the operating system provides for the user.
- (7) An information system is software that helps us organize and analyze data.
- (8) An algorithm is a calculation that determines how long it will take to solve a problem.
- (9) Stacks and queues can be implemented only as a linked structure.
- (10) A sequential search requires that the data be sorted.
- (11) The Quicksort algorithm is based on a "divide and conquer" strategy.
- (12) Printers can be connected directly to a computer network.
- (13) A file server stores and manages files for multiple users on a network.
- (14) Network packets contain instructions regarding the route they should travel to reach their destination.
- (15) A tree is a non-linear data structure.

2. (10%) What sequence of numbers would be printed if the following procedure were executed with the value of N being 0?

```
procedure xxx (N)
while (N < 4) {
  print the value of N;
  N ← N + 2;
  print the value of N
}
```

3. (15%) Write a function (in C-like pseudo code) that calculates the multiplication of an $m \times p$ matrix A and a $p \times n$ matrix B and then gets a resulting matrix C .

4. (15%) Draw the binary search tree that results from inserting the following value in this order: 38, 20, 5, 59, 28, 12, 1, 45, 80, 50

5. (10%) Solve each of the following recurrence relations $T(n)$ (in big- O notation). Assume that n is a power of 2 and that $T(1) = 1$.

(1) $T(n) = 2T\left(\frac{n}{2}\right) + n$

(2) $T(n) = 2T\left(\frac{n}{2}\right) + n \log n$

※ 注意：1.考生須在「彌封答案卷」上作答。

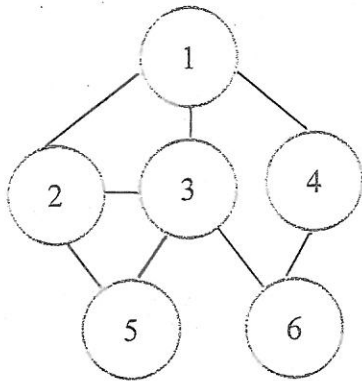
2.本試題紙空白部份可當稿紙使用。

3.考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。

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6. (20%) Consider the following undirected graph.



- (1) Give each of the following representations of this graph. (10%)
 - (1.1) adjacency list
 - (1.2) adjacency matrix
- (2) According to the adjacency list representation obtained from (1.1), list the vertex sequence of each of the following vertex traversal methods starting from vertex 1. (10%)
 - (2.1) depth-first search
 - (2.2) breadth-first search