註：本次考試　不可以參考自己的書籍及筆記；　不可以使用字典；　不可以使用計算器。

一、選擇 (50%, 每題2分)

1. _____ As a consequence of using a FIFO storage policy, the last element inserted in the queue will be the last element removed. (A) True　　(B) False

2. _____ Nodes in a general tree can have any number of subtrees. (A) True　　(B) False

3. _____ By implementing a queue based on a linear array, we can do an insertion at the rear of the array in _____ time. (A) O(1)　(B) $O(n \log_2 n)$　(C) O(n)　(D) $O(n^2)$

4. _____ Which of the following terms best describeds circuit boards, keyboards, and disk drives? (A) computer system (B) computer hardware (C) computer software (D) stored memory.

5, _____ A compiler translates what language to what language. (A) machine language into assembly language (B) high-level language into machine language (C) high-level language into assembly language (D) assembly language into machine language

6. _____ A von Neumann computer architecture is best characterized by (A) input device (B) read only memory (C) random access memory (D) stored-program concept

7. _____ Which of the following manages the fetch-execute cycle? (A) control unit (B) arithmetic logic unit (C) auxiliary storage device (D) random access memory

8. _____ Which of the following instruction allows an action (or set of actions) to be executed multiple times? (A) assignment (B) repetition (C) selection, if-then (D) declaration

9. _____ Which of the following best describes the set of rules, symbols, and special words used to construct a program? (A) semantics (B) syntax (C) program statements (D) programming language

10. _____ Which of the following is executed by the Java virtual machine. (A) procedure (B) pseudocode (C) Bytecode (D) algorithm

11. _____ Which of the following is the ability for a subprogram to call itself? (A)argument (B) parameter (C) recursion (D) nested logic

12. _____ Which of the following would not require real time processing? (A) Typing a document with a word processor (B) Navigation of an aircraft (C) Forcasting worldwide trade for the next 5 year (D) Maintaining an airline reservation system.

13. _____ What is the time complexity of the problem of searching for a particular entry in a lsit. (A) O(log n) (B) O(n) (C) O(n log n) (D) $O(n^2)$

14. _____ When searching the name list (Lewis, Morris, Nancy, Oliver, Pat, Quincy, Roger, Stan, Tom), Which of the following entry will be found most quickly using the binary search algorithm (A) Lewis (B) Pat (C) Tom (D) Stan

15. _____ Assume the following pseudocode for the Fibonacci series, what is the value of the 5th Fibonacci number F(5)? F(0)=0; F(1)=1; F(n)=F(n-1)+F(n-2) (A) 1 (B) 3 (C) 5 (D) 7

16. _____ Which of the following representation is erroneous (A) 22A (B) 110_2 (C) EF_{16} (D) 141_8

17. _____ In which of the following addition problems (using 2's complement notation) does an overflow error occur? (A) 0011+1010 (B) 0100+0100 (C) 1100+1100 (D) 0101+1000

18. _____ Recursion is memory-intensive because: (A) Recursive functions tend to declare many local variables. (B) Previous function calls are still open when the function calls intself and the activation records of these previous calls still occupy space on the call stack (C) Many copies of the function code are created. (D) It requires large data values.

19. _____ A stack is initially empty, the the following commands are performed: push(5), push(7), pop(), push(10), push(5), pop(). Which of the following is the correct stack after those commands (assume the top of the stack is on the **left**)? (A) 5, 10, 7, 5 (B) 5, 10 (C) 7, 5 (D) 10, 5

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20. _____ What is the term for the memory chips that are similar to random access memory, but that run much faster? (A) ROM (B) Cache (C) RAM (D) Disk

21. _____ During execution of a program, both the program and the data it is analyzing are held in which portion of the computer?(A) ROM (B) RAM (C) Control unit (D) ALU

22. _____ A computer's initial start-up instructions are in which portion of the computer? (A) RAM (B) Control unit (C) Disk storage (D) ROM

23. _____ If the memory address space is 16MB and the word size is 8 bits, then _____ bits are needed to access each word. (A)8 (B) 16 (C) 24 (D) 32

24. _____ _____ is a protocol for accessing and transferring documents on the WWW. (A) FTP (B) SMTP (C) MINE (D) HTTP

25. _____ Using the following function definition in C language t f(p) {s}, the parameter list is represented by (A) t (B) f (C) p (D) s

二、問答題（50%）

1. (10%) Using the documentation comment as a guide, correct the logic and syntax errors in the following C language function.
```
/* compute factorial of integer n
    執行前: integer n is positive
    執行後: return integer factorial value of n        */
factorial (double n){
  int result;
  double index  = 1
  while (index < n)
    result *= index
    index+;
  return index;
}
```

2. (10%) Determine how many times the output statement is displayed in each of the following fragments. Indicate whether the fragment execution time is O(n) or O(n^2).
```
a. for (int i = 0; i < n; i++)
    for (int j = 0; j < 2; j++)
      cout << i << " " << j << endl;
b. for (int i = 0; i < n; i++)
    for (int j = n - 1; j >= i; j--)
      cout << i << " " << j << endl;
```

3. (a) (10%) Show your work to draw the binary search tree whose elements are inserted in the following order: 50, 72, 96, 107, 26, 12, 11, 9, 2, 10. (b) (10%) Write the output sequence of your binary tree in postorder and inorder.

4. (10%) Translate the binary representation 101.101_2 into its equivalent base 10 representation.