

國立臺灣師範大學 96 學年度學士班二年級轉學生招生考試試題

學系(組)：資訊工程學系

專門科目：計算機概論

注意事項：1. 依次序作答，只要標明題號，不必抄題。

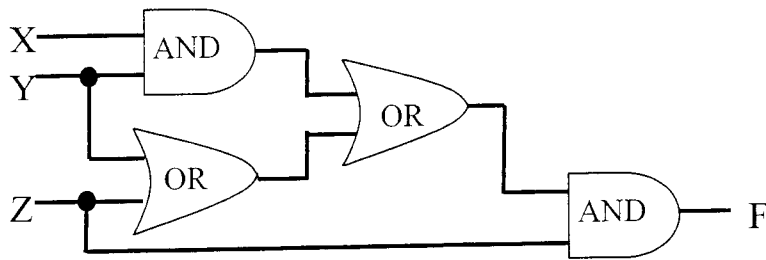
2. 答案必須寫在答案卷上，否則不予計分。

一、簡答題

1. [5 分] Write the postfix form of the following expressions:

$$A / (A - C) + (D - B) * C$$

2. [5 分] Given a combinational logic circuit as follows:



If output $F = 0$, please list all the possible inputs.

3. Given a sorting example at right.

- (1) [2 分] Which sort algorithm does the example use? Selection sort, insertion sort, bubble sort, quick sort, or merge sort?

- (2) [8 分] Based on the example, please finish the following algorithm.

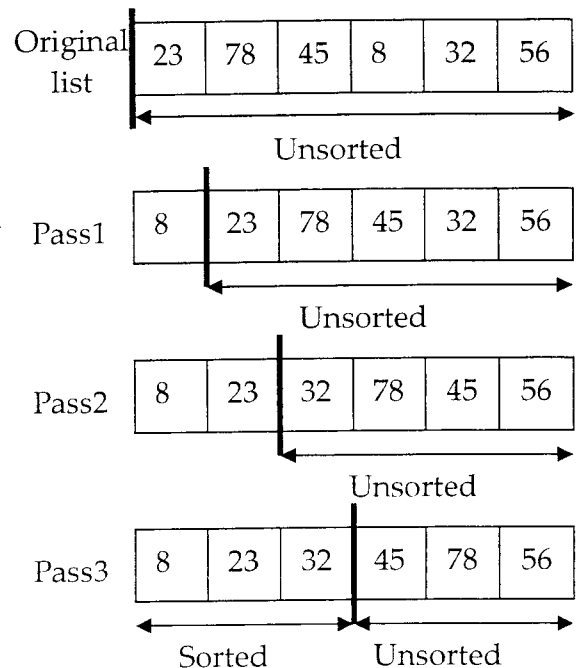
Sort (array A)

for $i = 1$ to $\text{length}[A]$

do for $j = \text{length}[A]$ downto $i + 1$

do if $A[\underline{(a)}] < A[\underline{(b)}]$

then exchange $A[\underline{(c)}] \leftrightarrow A[\underline{(d)}]$

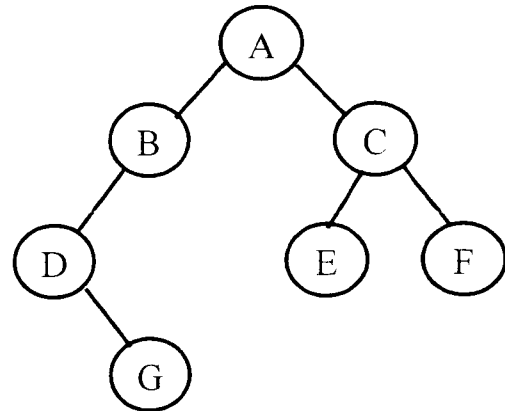


4. [5 分] Given the frequency table as follows

Character	A	B	C	D	E	F
Frequency	19	7	4	1	45	24

If the Huffman code of character “A” is 111, “B” is 1101, and “C” is 11001, encoding the character list “FEDD”

5. [5 分] If the tree at right is a binary search tree, and stores the keys: 2, 5, 8, 9, 10, 14, 17. Please draw this binary tree, and put their corresponding keys on the nodes.



二、是非題[10 題，每題 3 分，共 30 分]

1. There are two basic types of communication paths: parallel and serial. Existing telephone lines are inherently parallel communication system.
2. If the computer's input/output devices appear to be in various memory locations, such a communication system is called memory-mapped I/O.
3. Personal computers starts by executing the bootstrap program which is stored in the RAM.
4. In star topology of the network, the machines are connected in a circular fashion.
5. Each machine in the Internet is assigned a unique address, called an IP address. For example, 140.122.276.44 is a correct IP address.
6. In order to locate and retrieve documents on the World Wide Web, each document is given a unique address called a Uniform Resource Locator (URL). For example, <http://www.csie.ntnu.edu.tw> is a correct URL.

7. Black-box testing is one kind of software testing. In black-box testing, the software tester is aware of the interior structure of the software and uses this knowledge when designing the test.
8. Let \neg denote logical operator NOT, then the following collection of statements is inconsistent: $(P \text{ OR } Q \text{ OR } R)$, $(\neg R \text{ OR } Q)$, $(R \text{ OR } \neg P)$, and $(\neg Q)$.
9. A cycle is a path of at least three vertices that starts and ends with the same vertex.
10. Sorting is a basic algorithm that arranges data according to their values.

三、選擇題[10 題，每題 4 分，共 40 分]

1. Given two bit patterns, $A = 01100110$ and $B = 10101011$, please perform the indicated operations $((A \text{ AND } B) \text{ OR } (A \text{ XOR } B))$. The answer represented by the hexadecimal notation is
 (A) 00 (B) CD (C) EF (D) FF
2. Convert the binary representation 110.011 to its equivalent based ten form, and the answer is
 (A) $6\frac{3}{8}$ (B) $6\frac{7}{16}$ (C) $6\frac{7}{8}$ (D) $6\frac{3}{16}$
3. Which one is **incorrect**?
 (A) The steps in the machine cycle are fetch, decoded, and execute.
 (B) The program counter contains the address of the next instruction to be executed.
 (C) The instruction register is used to hold the instruction being executed.
 (D) During the decoded step, the control unit requests that main memory provide the instruction stored at the address which is indicated by the program counter.

4. If two or more processes are blocked from progressing because each is waiting for a resource that is allocated to another, then this problem is called
- (A) interrupt (B) mutual exclusion
(C) time-sharing (D) deadlock
5. Let the depth of a tree be the maximum level of any node in the tree, and the level of a node is defined by letting the root be at level one. Given a depth of the binary tree, k , $k \geq 1$, the maximum number of nodes in the tree is
- (A) $2^{k-1} + 1$ (B) $2^{k-1} - 1$ (C) $2^k - 1$ (D) k

6. Consider the function represented by pseudo-code at right. What is the value of Function1(6) ?

- (A) 20
(B) 21
(C) 22
(D) None of the above

```
Function1(integer n)
{
    if (n = 1)
        return 0;
    else
        return (n + Function1(n-1));
}
```

7. Consider the function represented by pseudo-code at right. What is the value of F(16) ?

- (A) 8
(B) 10
(C) 32
(D) None of the above

```
F(integer n)
{
    if (n <= 4)
        return 2;
    else
        return (F(n/2) + 2 * F(n/4));
}
```

8. Consider the function represented by pseudo-code at right. What is the value of $A[5]$?

(A) 19
(B) 29
(C) 49
(D) None of the above

```
A[1] := 1;  
A[2] := 2;  
for  $i = 3$  to 99 do  
     $A[i] := (2 * A[i-1]) + A[i-2]$   
endfor
```

9. If the initial values of array A are $A[i] = 0, i = 0, 1, \dots, 6$. After running the code at right, what is the value of $A[5]$?

(A) -1
(B) 3
(C) 5
(D) None of the above

```
 $k := -1; \quad j := 0;$   
while ( $j < 7$ ) do  
{  
    if ( $A[j] > 3$ )  
    {  $A[j] := k; \quad k := j+1;$   
    }  
    else  
    {  $A[j] := j; \quad j = j+1;$   
    }  
}
```

10. How many different 4-node binary tree can be created?

(A) 5
(B) 14
(C) 15
(D) None of the above