

國立臺灣師範大學 98 學年度學士班二年級轉學生招生考試試題

科目：計算機概論

適用學系(組)：資訊工程學系

注意：1.本試題共 5 頁，請依序作答，並標明題號，不必抄題。

2.答案必須寫在答案卷上之指定作答區內，否則依規定予以扣分。

一、選擇與填空 [每小題 2 分，共計 52 分]：

1. Given some terminologies of computer science as follows:

- | | |
|---|---------------------------------------|
| A. Uniform Resource Locator (URL) | B. Hypertext Transfer Protocol (HTTP) |
| C. Simple Mail Transfer Protocol (SMTP) | D. File Transfer Protocol (FTP) |
| E. Hypertext Markup Language(HTML) | F. Internal Protocol (IP) |
| G. TErminAl NETwork (TELNET) | H. Local Area Network (LAN) |

Please answer the questions:

- (a) (2 分) Which one is a client-server program that is used to access and transfer documents on the World Wide Web?
- (b) (2 分) Which one is a general client-server program on the Internet that allows remote login?
- (c) (2 分) Which one is used for transferring files?
- (d) (2 分) Which one is a standard identifier for specifying information on the Internet?

2. Given some terminologies of computer science as follows:

- | | | |
|--------------------------------|----------------------------------|-------------------------------|
| A. isolated I/O | B. interrupt-driven I/O | C. memory-mapped I/O |
| D. programmed I/O | E. direct memory access (DMA) | F. universal serial bus (USB) |
| G. arithmetic logic unit (ALU) | H. central processing unit (CPU) | |

Please fill in the blanks:

- (a) (2 分) The _____ performs arithmetic and logical operations, which can add two inputs.
- (b) (2 分) In the _____ method to synchronize the operation of the CPU with the I/O device, a large block of data can be passed from an I/O device to memory directly.
- (c) (2 分) The _____ controller is a serial device that connects slow devices such as the keyboard and mouse to the computer.
- (d) (2 分) In the _____ method, the instructions used to read/write memory are totally different from the instruction used to read/write input/output devices. Each input/output device has its own address..

3. Given some terminologies of computer science as follows:

- | | | | |
|-----------------|-----------------|---------------|----------------|
| A. batch | B. time-sharing | C. parallel | D. distributed |
| E. hierarchical | F. network | G. relational | H. linked list |

Please fill in the blanks:

- (a) (2 分) A system with more than one CPU requires a _____ operating system.
- (b) (2 分) Multiprogramming requires a _____ operating system.
- (c) (2 分) The _____ database model arranges its data in the form of an inverted tree.
- (d) (2 分) Of the various database models, the _____ model is the most prevalent today.

4. Given some terminologies of computer science as follows:

- | | | | |
|--------------|----------------|--------------|--------------|
| A. waterfall | B. incremental | C. white box | D. black box |
| E. secret | F. private | G. public | H. skeleton |

Please fill in the blanks:

- (a) (2 分) In encryption/decryption, the _____ key is known by everyone.
- (b) (2 分) In the digital signature method, the sender uses his or her _____ key to encrypt the message.
- (c) (2 分) In the _____ model of software development, an entire phase of the project is completed before the next phase starts.
- (d) (2 分) _____ testing, which is the responsibility of the programmer, assumes that you know everything about the program.

5. Given some terminologies of computer science as follows:

- | | | | |
|-------------|-------------|-------------|-------------|
| A. 2 | B. 4 | C. 8 | D. 16 |
| E. 10000101 | F. 00100101 | G. 10101010 | H. 01010101 |

Please fill in the blanks:

- (a) (2 分) In unsigned integers, a 4-bit allocation allows _____ nonnegative numbers.
- (b) (2 分) The binary notation of the decimal number 37 is _____ .
- (c) (2 分) ((10101010 OR 01010101) XOR 01111010) is _____ .
- (d) (2 分) Compute the equation of the octal notation $(310)_8 / (062)_8$ and convert the result into the decimal number. The answer is _____ .

6. Given some intermediate results of sorting algorithms:

A. 8 23 45 78 32 56

B. 8 23 32 78 45 56

C. 23 45 78 8 32 56

D. 8 23 32 45 78 56

E. 8 78 45 23 32 56

F. 23 78 45 8 32 56

If we want to sort the original list 23 78 45 8 32 56 and the smallest number should be at the first place, please answer the questions:

(a) (2 分) Which one is the intermediate result of selection sort after pass 2?

(b) (2 分) Which one is the intermediate result of bubble sort after pass 2?

(c) (2 分) Which one is the intermediate result of insertion sort after pass 2?

7. Given some intermediate results of sorting algorithms:

A. An array

B. A record

C. A node

D. A variable

E. An index

F. A linked list

Please fill in the blanks:

(a) (2 分) _____ is a fixed-size, sequenced collection of elements of the same data type.

(b) (2 分) _____ is a collection of related elements, possibly of different types, having a single name.

(c) (2 分) _____ is an ordered collection of data in which each element contains the location of the next element.

二、計算簡答題[每題 6 分，共計 48 分]：

1. (6 分) The following is a multiplication problem in traditional base ten notation. Each letter represents a different digit. What digit does each letter represent?

$$\begin{array}{r} \text{X Y} \\ \times \text{Y X} \\ \hline \text{X Y} \\ \text{Y Z} \\ \hline \text{W V Y} \end{array}$$

2. (6 分) Does the loop in the following routine terminate? Explain your answer. Explain what might happen if this routine is actually executed by a computer.

```
X ← 1; Y ← 1 / 2 ;
while (X not equal 0) do
( X ← X - Y;
  Y ← Y / 2 )
```

3. (6 分) The following program segment is designed to compute the product of two nonnegative integers **X** and **Y** by accumulating the sum of **X** copies of **Y** – that is, 3 times 4 is computed by accumulating the sum of three 4s. Is the program correct? Explain your answer.

```

Product  $\leftarrow$  0; Count  $\leftarrow$  1;
repeat
  ( Product  $\leftarrow$  Product + Y;
    Count  $\leftarrow$  Count + 1 )
until (Count = X)

```

4. (6 分) After running the code as follows, what is the value of **A[6]** ?

```

N = 10; A[1] = 1; A[2] = 4; A[3] = 9;
for i = 4 to N do
  A[i] = A[i-1] * A[i-3];
endfor

```

5. This pseudo-code can be used to calculate the values of a recursive function, please

(1) (3 分) show the function **F**, and

(2) (3 分) calculate **F**(6).

```

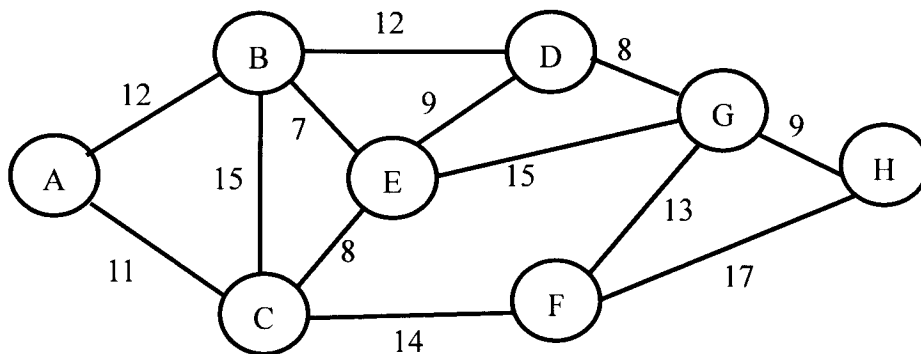
function F(N: integer): integer
begin
  if N  $\leq$  4 then   return(1)
    else           return(N * F(N - 1))
end

```

6. Given a graph **G** with 8 nodes and 13 links, the weight of the links indicates the distance between two connected nodes, please answer the questions.

(a) (3 分) Show the minimum spanning tree.

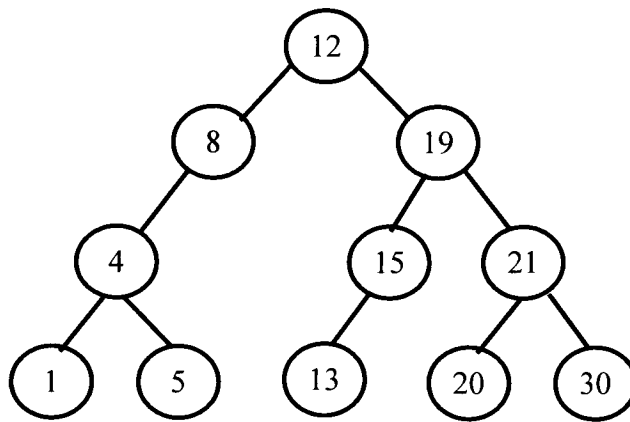
(b) (3 分) Show the shortest path from node **A** to node **H**.



7. Given a tree T , please answer the questions.

(a) (3 分) Is it a binary search tree? Why or why not?

(b) (3 分) Show the result of its preorder traversal



8. (6 分) Is the following collection of statements consistent? Explain your answer.

$(P \text{ OR } Q \text{ OR } R)$

$(\neg R \text{ OR } Q)$

$(R \text{ OR } \neg P)$

$(\neg Q)$