

**I. Multiple Choice – 單選題(40%)**

- \_\_\_ 1. Convert  $(34.25)_{10}$  to its binary representation.  
(A) 010001.01      (B) 010001.1      (C) 100010.01      (D) 100010.1
- \_\_\_ 2. Using 8-bit to represent the integer  $(-25)_{10}$  in two's complement.  
(A)  $(11100110)_2$       (B)  $(11100111)_2$       (C)  $(10011001)_2$       (D)  $(00011001)_2$
- \_\_\_ 3. Which is not the function of the operating system?  
(A) It communicates with the user.      (B) It determines what the user wants.  
(C) It activates system programs.      (D) It solves application problems.
- \_\_\_ 4. The \_\_\_ operating system allows many programs in memory at one time.  
(A) time-sharing      (B) multi-tasking      (C) real-time      (D) batch
- \_\_\_ 5. The \_\_\_ keeps a list of programs ready to run and selects the one that will execute next.  
(A) memory manager      (B) scheduler      (C) file management      (D) information manager
- \_\_\_ 6. Which type of operating systems is used in a missile launching system?  
(A) parallel      (B) embedded      (C) compact      (D) real-time
- \_\_\_ 7. To alert computer that an input/output operation is done, a(n) \_\_\_ is transmitted to the processor.  
(A) interrupt signal      (B) condition code      (C) broadcast      (D) execution instruction
- \_\_\_ 8. The \_\_\_ of disk is the time for the beginning of the desired sector to rotate under read/write head.  
(A) latency      (B) transfer time      (C) seek time      (D) access time
- \_\_\_ 9. Which is not the disadvantage of the machine language?  
(A) It uses mnemonics.      (B) It is difficult to program.  
(C) It is difficult to create data.      (D) It allows only numeric memory addresses.
- \_\_\_ 10. When the number of bits representing an unsigned integer in a computer is not enough, what situation will occur?  
(A) overclock      (B) overflow      (C) underflow      (D) underclock
- \_\_\_ 11. \_\_\_ is a number that uniquely identifies each computer or device connected to Internet.  
(A) IP address      (B) Domain name      (C) URL      (D) E-mail address
- \_\_\_ 12. The \_\_\_ layer can create a universal addressing scheme for all network nodes.  
(A) Transport      (B) Data link      (C) Network      (D) Application
- \_\_\_ 13. What device can connect two different LANs?  
(A) Modem      (B) Hub      (C) Router      (D) Bridge
- \_\_\_ 14. The \_\_\_ topology has a single central node that is connected to all other sites.  
(A) Ring      (B) Star      (C) Bus      (D) Mixed
- \_\_\_ 15. A(n) \_\_\_ is a collection of documents interconnected by pointers called links.  
(A) Transport      (B) Hypertext      (C) FTP      (D) HTTP

- \_\_\_\_\_ 16. The statement "if (n >= 0) print n" is the \_\_\_\_\_ operation.  
 (A) Conditional (B) Iterative (C) Sequential (D) Hierarchal
- \_\_\_\_\_ 17. The \_\_\_\_\_ operations alter the normal sequential flow of control.  
 (A) Arithmetic (B) Compare (C) Branch (D) Data transfer
- \_\_\_\_\_ 18. The \_\_\_\_\_ holds the address of the next instruction to be executed.  
 (A) Program counter (B) Status register (C) Instruction register (D) Memory address register
- \_\_\_\_\_ 19. When we use more bits to represent a floating-point number in computers, which of the following statements is incorrect?  
 (A) Larger number can be represented. (B) More precise number can be represented.  
 (C) Smaller number can be represented. (D) More truncation error can be represented.
- \_\_\_\_\_ 20. The \_\_\_\_\_ is used to fetch, decode, and execute instructions.  
 (A) I/O unit (B) memory unit (C) control unit (D) arithmetic/logic unit

## II. Questions and Answers – 問答題 (60 %)

- (12%) Explain the following terms: (1) Android (2) Cloud Computing (3) Service Computing (4) Data mining
- (10%) Consider the following section of code:

```
main()
{
  int i = 3;
  int pid;
  while(i > 0) {
    if ((pid = fork()) > 0) {
      printf("In parent %d.\n", i);
      i--;
    } else {
      printf("In child %d.\n", i);
      exit(0);
    }
  }
}
```

- (1) (5%) Assume that the fork() system call is successful. How many processes will be created when the code is executed?
  - (2) (5%) What will be printed?
3. (10%)The Pascal triangle can be used to compute the coefficients of the terms in the expansion  $(a + b)^n$ . For example,  $(a + b)^2 = a^2 + 2ab + b^2$  where 1, 2, and 1 are coefficients. Write a function pascal (int a[][], int n) that creates a two-dimensional matrix a representing the Pascal triangle of size n. For example, a Pascal triangle of size 5 is shown below:

```
1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
```

4. (8 points) Write the result after executing the following program.

```
int func (int a, int b) {
    b *= 2;
    printf("a = %d, b = %d.\n", a, b);
    return (a + 2) * --b;
}

int sub (int *a, int *b) {
    *a += 2;
    printf("a = %d, b = %d.\n", *a, *b);
    return --*a * *b++;
}

main() {
    int x = 2, y = 3;
    y = func(x, y);
    printf("x = %d, y = %d.\n", x, y);
    y = sub(&x, &x);
    printf("x = %d, y = %d.\n", x, y);
}
```

5. (1) (5%) Consider the following recursive function. Rewrite it using iterative (nonrecursive) approach.

```
int sum(int n) {
    if (n < 1) return 1;
    return sum(n - 1) * sum(n - 1) + n;
}
```

(2) (5%) Consider the following function sum. Rewrite it as a recursive function.

```
int sum (int n) {
    int i, sum = 1;
    for (i = 1; i <= n; i++) sum += sum * i + i;
    return sum;
}
```

6. (a) (5%) Write a function that passes a double array and its size and returns the square summation of the array ( $a_1^2 + a_2^2 + \dots + a_n^2$ )

(b) (5%) Write a function that passes a double array and its size and reverse the array elements.