一、選擇題(單選題, 每題二分) 60%：〔※請依題號順序答於答案卷上〕

1. A computer is an electronic device, operating under the control of _____, that can accept data, process data arithmetically and logically, produce results from the processing, and store the results for future use.
   a. written commands input by the user
   b. instructions stored in its own memory unit
   c. cybernetic signals from a connected network
   d. programmed codes in documented procedures

2. The central processing unit (CPU) contains a control unit that _____.
   a. temporarily stores data and program instructions
   b. executes the program instructions
   c. stores instructions and data when they are not being processed
   d. performs math and logic operations

3. A _____ is a communication device used to connect computers over telephone lines.
   a. modem
   b. mouse
   c. speaker
   d. monitor

4. A personal digital assistant (PDA) _____.
   a. has a standard keyboard and at least one disk drive for storage
   b. is a larger version of notebook computer
   c. is one type of small pen input system designed for workers on the go
   d. has powerful calculating and graphics capabilities

5. System software consists of _____.
   a. business, scientific, and educational programs
   b. programs related to controlling the operations of computer equipment
   c. documented procedures covering computer operations
   d. programs that tell a computer how to produce information

6. Application software consists of programs that _____.
   a. tell the computer how to perform basic functions
   b. are related to controlling operations of computer equipment
   c. tell a computer how to produce information
   d. are loaded from hard disk and stored in memory each time a computer is turned on

7. Popular database software packages include all of the following *except* _____.
   a. Quattro Pro
   b. FoxPro
   c. Microsoft Access
   d. Paradox

8. _____ is a 16-bit code that has the capacity to represent more than 65,000 characters and symbols.
   a. ASCII
   b. Microcode
   c. Unicode
   d. EBCDIC

9. Many computers improve their processing efficiency by using high-speed _____ between the CPU and main RAM memory.
   a. RAM cache memory
   b. flash RAM
   c. ROM cache memory
   d. flash ROM

10. _____ technology increases overall processing capability by reducing the instructions to only those that are most frequently used.
    a. SCSI
    b. CISC
    c. RISC
    d. MIDI

11. Optical character recognition (OCR) devices _____.
    a. use the light pattern from bar code lines to identify items
    b. read carefully placed marks on a form that indicate responses to questions and can be matched against a previously entered answer key sheet
    c. use a pattern or symbol to represent data
    d. scan the shape of a character, compare it with a predefined shape stored in memory, and convert the character into the corresponding computer code

12. Every time the CPU requests data from the disk, _____ software looks for the data in that memory area first.
    a. disk mirroring
    b. disk cache
    c. disk formatting
    d. disk cartridge

13. RAID is an acronym for _____.
    a. reports on additional integrated data
    b. redundant array of inexpensive disks
    c. rotational access and input device
    d. recording and audio interface drivers

14. Because only one byte is transmitted at a time, the _____ transmission mode is relatively slow and is best used to send only small amounts of data.
    a. asynchronous
    b. digital
    c. synchronous
    d. analog

15. Internet traffic control is provided by _____, located throughout the Internet, which contain network maps.
    a. gateways
    b. bridges
    c. routers
    d. backbones

16. A Uniform Resource Locator (URL) can indicate _____.
    a. an Internet site
    b. a specific document at a site
    c. a location within a document at a site
    d. all of the above

17. A firewall is used to do all of the following *except* _____.
    a. restrict access to data on a network
    b. deny network access to outsiders
    c. limit employees' access to sensitive data
    d. store a copy of each Web page accessed

18. Multithreading allows multiple threads to _____.
    a. switch back and forth between operations
    b. execute the process that was least recently worked on
    c. execute simultaneously within the same program
    d. assign one or more increments of CPU time

19. A multiprocessing operating system coordinates the operations of the CPUs using either _____ multiprocessing.
    a. single tasking or timesharing
    b. context switching or multithreading
    c. asymmetric or symmetric
    d. cooperative or preemptive

20. _____ are built with redundant components, such as CPUs, memory, input and output controllers, and disk drives.
    a. Fault-tolerant computers
    b. Single tasking computers
    c. Special purpose computers
    d. Multitasking computers

21. Certain operating systems allocate only some memory for _____ and use them to store only the kernel and the data held in _____.
    a. buffers, partitions
    b. partitions, buffers
    c. pages, threads
    d. threads, pages

22. Direct file organization sometimes is called a(n) _____.
    a. relative or random file organization
    b. indexed or listed file organization
    c. sequential or ordered file organization
    d. hierarchical or family file organization

23. Which of the following is *not* an advantage that a database system offers over a file-oriented system? ＿＿＿
    a. improved data integrity
    b. increased data redundancy
    c. improved data security
    d. reduced development time

24. Frequently, a(n) _____ is integrated with a(n) _____.
    a. transaction processing system (TPS), expert system
    b. expert system, decision support system (DSS)
    c. management information system (MIS), transaction processing system (TPS)
    d. decision support system (DSS), management information system (MIS)

25. Which of the following is *not* true about expert systems?
    a. they operate within narrow preprogrammed limits
    b. they are able to think
    c. they cannot make decisions based on common sense
    d. they cannot make decisions on information outside their knowledge base

26. _____ methodology involves breaking down the program specifications into smaller components.
    a. Structured walkthrough
    b. Do-while control structure
    c. Top-down design
    d. Proper program design

27. A set of grammar or rules that specifies how instructions in a solution algorithm are to be written is called _____.
    a. pseudocode
    b. logic
    c. syntax
    d. proper program design

28. Security measures that define who can access a computer, when they can access it, and what *actions* they can take, are called _____.
    a. access control
    b. antivirus programs
    c. virus signatures
    d. computer security risks

29. _____ is the process of converting readable data into unreadable characters.
    a. Encryption
    b. Ciphertext
    c. Plaintext
    d. Call back

30. The abbreviation MPEG stands for _____.
    a. Motion Picture Exchange Graphics
    b. Multimedia Perfection Experts Group
    c. Multimedia Pictures Expert Graphics
    d. Moving Pictures Experts Group

二、問答題 40%：

1. (a) Determine what is calculated by the following recursive function： (2%)

```
int f(int n )
{ if (n < 0)
        return f(-n);
  else  if (n < 10)
            return n;
        else return f(n/10);
}
```

   (b) Write the nonrecursive version of the function f. (2%)

2. Determine the best **O** notation used to express the computing time for each of the following statements, algorithms, or operations: (2%*5)

(a)
```
while (n >= 1) n = n/2;
```

(b)
```
x = 1;
for (i = 1; i < n; i++)
{
    for (j = 1; j < x; j++)
        printf("%d\n", j);  /* write out the value of j */
    x = 2 * x;
}
```

(c) stack push operation

(d) determine whether the data items in a linked list are in ascending order

(e) choosing the pivoting element within the quick sort procedure

3. (a) Draw the binary search tree that is constructed when the following numbers are inserted in the order given :
50, 30, 40, 70, 80, 60, 20, 90, 10.　(5%)

(b) For the binary search tree of (a), display the output produced by (3%)
(i) an inorder traversal
(ii) a preorder traversal
(iii) a postorder traversal

(c) Begin with the binary search tree of (a), show the binary search tree that results after the sequence of operations is performed : (2%)
(i) delete 20
(ii) delete 50

4. Trace the construction of the AVL(Height-balanced) tree that results from inserting the following numbers in the given order. Show the tree and balance factors for each node before and after each rebalancing (rotation) : 55, 33, 77, 22, 11, 44, 88, 66, 99. (10%)

5. A string is said to be a **palindrome**, if it does not change when the order of characters in the string is reversed. For example : MADAM and 45811854 are palindromes. Write an algorithm that reads a string of characters, pushing each charter onto a stack as it is read and simultaneously adding it to a queue. When the end of the string is encountered, the algorithm should use the basic stack and queue operations (that is : push, pop, isemptystack, insert, remove, isemptyqueue) to determine if the string is a palindrome. (6%)