壹、 For the following questions, please select the best answer. (Each correct answer gets 2 points. There is no deduction on wrong answers.)

(1). Which of the following is equivalent to $(9B.DE)_{16}$? (a) $(155.29)_{10}$ (b) $(233.764)_8$ (c) $(232.677)_8$ (d) $(233.674)_8$

(2). What is the decimal number which is stored as 11010110 in sign-and-magnitude representation? (a) -42 (b) -86 (c) -84 (d) -24

(3). What is the sequence that CPU uses to execute instructions? (a) fetch, execute, and decode (b) decode, execute, and fetch (c) fetch, decode, and execute (d) decode, fetch, and execute

(4). Registers in a CPU can be used to stored (a) data (b) instruction (c) address (d) all of the above.

(5). In which type of I/O operations does the CPU need to wait for the I/O device to complete its operation? (a) programmed I/O (b) interrupt-driven I/O (c) DMA (d) recycle I/O

(6). A computer system uses memory-mapped I/O addressing scheme in its I/O controllers. Assume that the address bus consists of 10 lines and the main memory is made up of 2000 bytes with one address being assigned to each two bytes. How many four-register controllers can by access by the computer? (a) 4 (b) 6 (c) 8 (d) 10

(7). URL is a (a) language (b) address (c) number system (d) protocol

(8). Giving a URL, which one can determine its IP address? (a) IP (b) TCP (c) UDP (d) DNS

(9). TCP send a message to a corresponding application layer program based on (a) port number (b) line number (c) channel number (d) IP address

(10). Which memory management technique supports virtual memory? (a) partitioning (b) paging (c) demand paging (d) synchronization

(11). When an operating system puts too many resource restrictions on a process, which of the following could happen? (a) starvation (b) synchronization (c) paging (d) deadlock

(12). A process in the ready state can go to the running state when (a) it enters memory (b) it requests I/O (c) it gets access to CPU (d) it finishes running

(13). Which relational operation can be used to delete a column from a relation? (a) project (b) join (c) update (d) retrieve

(14). Which hashing method does not have synonyms or collisions? (a) digit extraction (b) division remainder (c) modulo division (d) direct

(15). Repudiation is a type of security attacks that threatens (a) confidentiality (b) integrity (c) availability (d) none of the above.

貳、 Answer the following questions. (Each one gets 5 points)

(1). Show how to use a mask to flip the middle two bits of an eight bit binary number.

(2). What are the fields of a node in a linked list?

(3). What does "polymorphism" mean in the object-oriented paradigm?

(4). What is an "algorithm"?

參、 Which are the three widely used methods of allocating disk space? (6 %) And among them,

  (a) Which one is inefficient to support a direct-access capability for a specific file block? (2 %)

  (b) Which one is with the worst reliability? (2 %)

  (c) Which one is with external fragmentation problem? (2 %)

肆、 (a) A DBMS is a combition of five components, what are the five components? (5 %)

  (b) The ANSI/SPARC has established a three-level architecture for a DBMS, what are the three levels? (3 %)

  (c) Which are the three models have been implemented in the history of Data-Base design? (3 %)

伍、 (a) From top-down point of view, please list the seven layers of OSI (Open Systems Interconnection) model. (5 %)

  (b) From top-down point of view, please list the five layers in the TCP/IP protocol suite. (3 %)

  (c) Please describe the hierarchies in *IPv4* and *IPv6* addressing. (**Note that：** you should show each field width in bits) (6 %)

陸、 (a) Please write the basic performance equation in terms of instruction count, CPI, and clock cycle time. (5 %)

  (b) A compiler designer is trying to decide between two code sequences for a particular computer. The hardware designers have supplied the following facts:

	CPI for each instruction class		
	A	B	C
CPI	3	2	2

For a particular high-level language statement, the compiler writer is considering two code sequences that require the folloing instruction counts:

Code sequence	Instruction counts for each instruction class		
	A	B	C
1	2	1	2
2	1	2	2

  (i) Which code sequence executes faster? (3 %)

  (ii) What is the CPI for each sequence? (2 %)

柒、 Given the following two code segments (code-(a) and code-(b), which one or both or neither will print out the message of "Data type mismatch"? (3 %)

```c
/*  code-(a)  */
#include <stdio.h>
#include <stdlib.h>
int main()
{
    char ch='A';
    if (ch < (char) 0xEF)
        printf("X");
    else
        printf("Data type mismatch");
    system("pause");
    return 0;

}
```

```c
/*  code-(b)  */
#include <stdio.h>
#include <stdlib.h>
int main()
{
    char ch='A';
    if (ch < 0xEF)
        printf("X");
    else
        printf("Data type mismatch");
    system("pause");
    return 0;

}
```