※ 考生請注意：**本試題不可使用計算機**

Problem I: (30 分)是非題，每小題 1 分

請用 T 與 F 符號分別代表對(是)與錯(否)。每小題若回答的答案是正確的，則得 1 分；若回答的答案是不正確的，除該題不給分外，另外要倒扣 1 分；不給答案以 0 分計。本大題最低分為 0 分。

1. All programming languages are essentially the same. Choosing one should be on a lowest cost basis.
2. A compiler is a program that reads each statement in the program and acts on it rather than creating a new machine language program.
3. File locking is a technique use to look out users from accessing sensitive data when they do not have the appropriate authorization.
4. Sorting is desirable technique that efficiently provides access to database in a variety of sequences.
5. Macros are tools that provide a way to link data in a spreadsheet to your favorite word processor.
6. UNIX is a multitasking, multiuser operation system.
7. In structured system analysis a decomposition method is used to progressively show the finer details of the system.
8. The running time for binary search algorithm is in O(n).
9. A program in execution is called a process.
10. Flash memory is one kind of volatile memory.
11. Microcode stored in ROM is called firmware.
12. DMA is a form of I/O in which a special module called DMA module is used to control the exchange of data between I/O and CPU.
13. A binary operator can only operate binary data.
14. An associate memory is one type of memory whose storage locations are identified by their contents or by a part of their contents.
15. Page fault occurs if an operating system makes a reference to a page which is not in main memory addressing space.
16. A partial ordering relation is a relation that is reflexive and transitive.
17. The bitwise XOR of the bit strings 1011110 and 0100001 is 0000000.
18. The number of edges for a full binary tree with 1000 nodes is 999.
19. Parity generators/checkers are useful because they do not require any additional data lines to function.
20. An eight-bit D/A converter have a resolution of 0.125.
21. Assembly language program are written using binary codes.
22. RAID 1 is a mirrored system.
23. A complete directed graph with n vertices has 2n edges.
24. The number of edges to be removed from a connected graph with n vertices and m edges to produce a spanning tree is $m-n+1$.
25. Every recursive program can be converted into equivalent iterative program.
26. In memory management, the *best-fit* strategy is always better than the *first-fit* strategy.
27. The binary tree can be uniquely determined if the pre-order traversal sequence of the binary tree is given.

系所組別：工程科學系在職專班甲組

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28. A max-heap is a complete binary tree.

29. In a baseband operation, the data is transmitted by modulating a single frequency signal from the selected frequency band.

30. SNMP is used to send and retrieve management-related information across a TCP/IP network.

Problem II: (60 分)選擇題，每小題 4 分

每小題之正確答案可能不只一個，須全部答對才得 4 分，若沒全部答對，除不給分外，另要倒扣 1 分；不給答案以 0 分計。本大題最低分為 0 分。

1. A decimal number represented by a 4-bit binary number, which of the following statement is incorrect?
   (a) Consider positive number, the decimal 10 is represented as a 1010.
   (b) The number -6 is represented as 1100 in 1's complement notation.
   (c) The number -1 is represented as 1001 in sign and magnitude notation
   (d) The number -8 is represented as 1000 in 2's complement notation.

2. Which one is not used to evaluate the CPU performance？
   (a) MIPS: Million Instructions Per Second.
   (b) CPI: Cycles Per Instruction.
   (c) MFLOPS: Million Floating-Point Per Second.
   (d) TPS: Transactions Per Second.

3. What is one disadvantage of the ripple-carry adder?
   (a) It is slow, due to propagation time.
   (b) More stages are required to a full-adder.
   (c) The interconnections are more complex.
   (d) All of the above are correct.

4. Using 4-bit adders to create a 16-bit adder
   (a) Requires 4 adders.
   (b) Requires 16 adders.
   (c) Requires the carry out of less significant adder to be connected to the carry in of the next significant adder.
   (d) Both (a) and (c) are correct.

5. An astable multivibrator is a circuit with
   (a) Is free-running.
   (b) Produces a continuous output signal.
   (c) Have two stable states.
   (d) Both (b) and (c) are correct.

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6. Which of the following is a type of shift register counter?

    (a) Decade.

    (b) Binary.

    (c) Ring.

    (d) BCD.

7. A 64MB SIMM is installed into a system but when a memory test is executed, the SIMM is detected as a 32MB device. What is possible cause?

    (a) The most significant address line is struck to high or low.

    (b) The address decoder on the SIMM is faulty.

    (c) The voltage on the memory module is incorrect.

    (d) The memory module was not installed properly.

8. Does there exist a simple graph with five vertices of the following degrees?

    (a) 1,2,3,4,5.

    (b) 3,3,3,3,2.

    (c) 3,4,3,4,3.

    (d) 0,1,2,2,3.

9. An expression ((x+2)^3)*(y-(3+x))-5 then

    (a) Its prefix notation is -* ^ + x 2 3 - y + 3 x 5.

    (b) Its Infix notation is ((((x+2)^3)*(y-(3+x)))-5.

    (c) Its postfix is x 2 + 3 ^ y 3 x + - * 5 -.

    (d) Both (b) and (c) are correct.

10. How many comparisons are used for sorting n items?

    (a) $O(n^2)$ for using selection sort.

    (b) $O(\log n)$ for using merge sort.

    (c) $O(n^2)$ in worst case for using quick sort.

    (d) All of above are correct.

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11. Which technique does the Hashing file belonging for the following file organization?

    (a) Tree structure indexing.

    (b) Direct access.

    (c) Table indexing.

    (d) Sequential access.

12. Which of the following statement is not correct?

    (a) Complier and linkage editor belong to system software.

    (b) HTML is a front page design language.

    (c) File management system is the component of an OS kernel.

    (d) In UNIX system, context-switch can be executed in non-kernel mode.

13. Which is not the necessary condition for producing a deadlock?

    (a) Bounded waiting.

    (b) Hold and wait.

    (c) Mutual exclusion.

    (d) No preemption.

14. Which of the following method is not used to solve the data hazard in pipeline architecture?

    (a) Data forwarding.

    (b) Pipeline stall.

    (c) Instruction scheduling.

    (d) Value prediction.

15. Which of the following statements is not correct?

    (a) C++ is an object-oriented language.

    (b) Linear search can be used for searching unsorted data set.

    (c) Proxy server can be used as firewall for protecting network.

    (d) The scheduler for a real time system is based on Round-Robin scheduling method.

Problem III (10 分)

1. Consider the following C function: (4分)

```
int  funct ( int a, int b)
 { if ( a == 0 )
     return (b);
  else
     return ( funct (a-1, b/4));
}
```

If the function funct is called with funct (4, 2048)

What is the final returned value?

2. For the following C program segment: (6分，每小題2分)

```
a. for (x = .1; x != 1.0;   x += .1)
     printf ( "%f\n",   x);
b. int    sum (int    n) {
     if ( n == 0) return 0;
     else    n + sum (n - 1) ; }
c. if ( strcmp ( stringa, stringb));
     printf ( " The two strings are equal \n);
```

Check the above codes, if there has any error, then point out and correct them.