

# 中原大學 102 學年度 碩士班 入學考試

102/3/2 10:00 ~ 11:30 電子工程學系晶片與系統組

誠實是我們珍視的美德，  
我們喜愛「拒絕作弊，堅守正直」的你！

科目：計算機概論

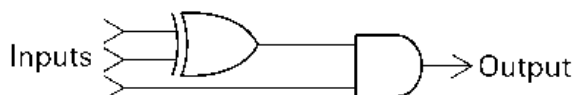
(共 3 頁第 1 頁)

可使用計算機，惟僅限不具可程式及多重記憶者

不可使用計算機

## I. Questions and Exercises (80%)

1. ( ) What input bit patterns will cause the following circuit to produce an output of 1? (a) 111, (b) 010, (c) 101, (d) 001.



2. ( ) A step-by-step solution to a problem is called (a) hardware, (b) an algorithm, (c) a computer language, (d) an operating system.
3. Convert each of the following base two representations to its equivalent decimal form.
- $0110 = (\underline{\hspace{2cm}})_{10}$
  - $10101101 = (\underline{\hspace{2cm}})_{10}$
4. Convert the following decimal numbers to the number system with base 6 without using a calculator:
- $541 = (\underline{\hspace{2cm}})_6$
  - $10.3 = (\underline{\hspace{2cm}})_6$
5. ( ) What is BIOS (Basic Input/Output System)? (a) is charged with the task of coordinating the machine's use of the main memory, (b) a PC's ROM contains a collection of software routines for performing booting and fundamental input/output activities, (c) is the allocator of the machine's resources to the processes in the system, (d) a unit in CPU which handles the basic arithmetic and logical calculation.
6. ( ) A program that enters a computer system disguised as a desirable program and performs additional activities that might have harmful effects is called (a) virus (b) worm (c) Trojan horse (d) spyware.
7. ( ) In "digital signature", which key is used to sign (encrypt) the document? (a) public key (b) private key (c) both public key and private key (d) either public key or private key.
8. ( ) Apply the binary search algorithm to a sorted list which contains 1000 numbers, what is the worst case of the number of hitting target? (a) 1 (b) 8, (c) 1000, (d) depend on the computer.
9. ( ) In the complexity of computation problems, Big-O notation is used to (a) measure the spend time in second when it runs the program (b) measure the

complexity of a solvable problem is to find the number of operations executed by the computer when it runs the program (c) reminder the program is an NP-hard problem (d) reminder an extra computational space is required when it runs the program.

10. ( ) From the following list, extract a collection of numbers whose sum is 3165. How efficient is your approach to the problem? 26, 39, 104, 195, 403, 504, 793, 995, 1156, 1677 (a)  $O(n)$ , (b)  $O(n^2)$ , (c)  $O(\lg n)$ , (d)  $O(2^n)$ .
11. Find the root of each of the following binary trees:  
(a) Tree with postorder traversal: FCBDG. Ans: \_\_\_\_\_  
(b) Tree with preorder traversal: IBCDFEN Ans: \_\_\_\_\_
12. ( ) Data is compressed using a dictionary with indexes to strings. This is  
(a) Huffman encoding (b) lossy coding (c) Morse coding (d) Lempel Ziv encoding
13. ( ) What is an example of lossy compression.  
(a) Huffman encoding (b) MP3 (c) Run-length encoding (d) FLAC
14. ( ) When we download files from Internet, there is usually having a MD5 series code beside. What purpose the MD5 series code is used for? (a) confidentiality (b) integrity (c) availability (d) all of the above
15. An imaginary computer has sixteen data registers (R0 to R15), 1024 words in memory, and 16 different instructions (add, subtract, and so on).  
i. ( ) What is the minimum size of an instruction in bits if a typical instruction uses the following format: *add M R2*. (*M* means the memory address)  
ii. ( ) What is the size of the data bus in the computer?  
iii. ( ) What is the minimum size of the control bus in the computer?

## II. C Language · Read the following programs and write out the output of them. (20%)

1. (10%)

```
1. #include <stdio.h>
2. #define PI 3.14159
3. #define AREA(r) ((r)*(r)*(PI))
4. #define MAX(a, b) ((a > b) ? a : b)
5. void main(void)
6. {
7.     int r = 5;
8.     printf("AREA(%d) = %f\n", r, AREA(r));
9.     printf("MAX(88, 85) = %d\n", MAX(88, 85));
10.    return;
```

```
}
```

2. (10%)

```
1. #include <stdio.h>
2. #include <conio.h>
3. #include <cstdio>
4. #include <string>
5. using namespace std;
6. int add(int*, int*);
7. string add(string*, string*);
8. void main(void)
9. {
10.     int i = 789, j = 876;
11.     string x = "object";
12.     string y = "oriented";
13.     printf("i = %d\n",i);
14.     printf("j = %d\n",j);
15.     printf("i + j = %d\n", add(&i, &j));
16.     printf("i = %d\n",i);
17.     printf("j = %d\n\n",j);
18.     printf("x = %s\n", x.c_str());
19.     printf("y = %s\n", y.c_str());
20.     printf("x + y = %s\n", add(&x, &y).c_str());
21.     printf("x = %s\n", x.c_str());
22.     printf("y = %s\n\n", y.c_str());
23.     printf("\n按<<Enter>>結束程式.");
24.     return;
25. }
26.
27. int add(int *x, int *y)
28. {
29.     *x += *y;
30.     *y = -(*y);
31.
32.     return *x;
33. }
34.
35. string add(string *x, string *y)
36. {
37.     *x += (" " + *y);
38.     *y = "change";
39.
40.     return *x;
41. }
```