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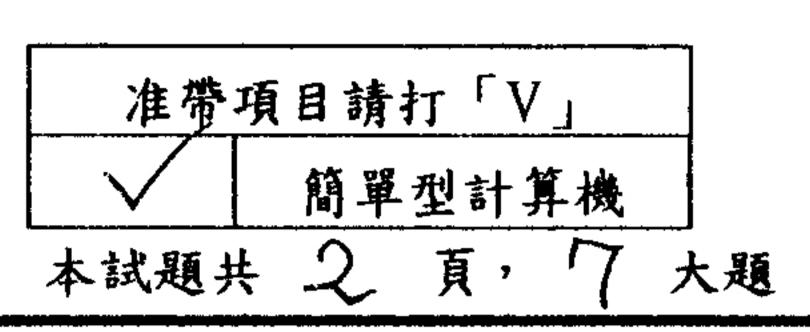
## 淡江大學97學年度碩士班招生考試試題

系別: 電機工程學系積電計算系統組 電機工程學系機器人工程碩士班

科目:計算機概論

BIA

对中国的新矿和系统。



- 1. (15%) In the pipelining system, structure hazard, control hazard, and data hazard may appear to degrade the performance. Please explain these three hazards and give proper solutions to remove them, respectively.
  - (a) Structure hazard
  - (b) Control hazard
  - (c) Data hazard
- 2. (20%) Please briefly describe the differences between the following terms:
  - (a) FIFO/FILO
  - (b) Temporal locality / Spatial locality
  - (c) Write through / Write back
  - (d) Structured programming / Object oriented programming
- 3. (10%) Construct a 3-bit counter using three T flip-flops and several basic gates. One of the two input signals can reset the counter to 0, called *reset*, and the other will increment the counter, called *inc*. The outputs should be the value of the counter. When the counter has value 7 and is incremented, it should go back to 0.
- 4. (10%) Design a circuit which compares two 4-bit numbers, A and B, to check if they are equal. The circuit has one output x, so that x = 1 if A = B, x = 0 if  $A \neq B$ .
- 5. (20%) A particular type of Hamming code has 8-bit codeword  $P_8D_7D_6D_5P_4D_3P_2P_1$ . The parity bits  $P_i$  are obtained from the data bits  $D_j$  according to logical equations

 $P_1 = D_3 \oplus D_5 \oplus D_6$ ,  $P_2 = D_3 \oplus D_5 \oplus D_7$ ,  $P_4 = D_3 \oplus D_6 \oplus D_7$ ,  $P_8 = D_5 \oplus D_6 \oplus D_7$ .

- (a) Could this code correct any single-bit error? (Derive the correction rules briefly)
- (b) Could the code detect all double-bit errors in addition to correcting single errors? (If yes/no, explain your answer using example/counterexample)
- 6. (10%) Consider the following VB program, in the execution mode, what is printed out while pressing the Command1?

```
Private Sub Command1_Click()

Dim Num, Power, Leader As Integer

Dim Sum As Integer

Num = 68413

Power = 4

Do

Leader = (Num \ 10 ^ Power)

Sum = Sum + Leader

Print Sum

Num = Num - (Leader * 10 ^ Power)

Power = Power - 1

Loop Until Num < 10

Sum = Sum + Num

Print Sum

End Sub
```

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准帶項目請打「V」 簡單型計算機 2頁,7 本試題共

(15%) Consider the following C++ program, what is printed out after execution?

```
#include <iostream.h>
#define SIZE 100
int recur_binary_search(int low, int high, int key);
int a[SIZE];
int chance = 1;
int main(void)
     int i;
     for(i=0; i<SIZE; i++){
          a[i] = i+1;
     if(recur_binary_search(0, SIZE-1, 31) != -1){
          cout << chance << " times" << endl;
     }else{
          cout << "Not found!!" << endl;</pre>
     return 0;
int recur_binary_search(int low, int high, int key)
     int middle;
     while( low <= high){
          middle = (low + high)/2;
          cout << "a[" << middle << "]" << '\t';
          if(key = a[middle]){
               cout << endl;
               return middle;
          }else if(key < a[middle]){</pre>
               chance++;
               return recur_binary_search(low, middle-1, key);
          }else{
               chance++;
               return recur_binary_search(middle+1, high, key);
     return -1;
```