

# 國立臺北科技大學

## 九十七學年度電資碩士在職專班招生考試

### 計算機概論 試題

填 准 考 證 號 碼

第一頁 共二頁

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#### 注意事項：

1. 本試題共【7】題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在答案卷之答案欄內，否則不予計分。

1. (1) Given a data string, BBBBFFFGGGGKKKKKHH. Write the encoded codeword by applying the Run-length encoding. (5%)  
(2) Explain the term “lossy data compression” and give two examples. (5%)  
(3) What is the meaning of MP3? Give the name of encoding technique. (5%)
2. Given the probabilities of occurrence of symbols B, F, G, H, K, and I are 0.19, 0.13, 0.31, 0.2, 0.07, and 0.1, respectively.  
(1) Construct the encoding tree for Huffman encoding. (8%)  
(2) Given an encoded binary string “111010001011”. Using the Huffman encoding tree designed in (1) to decode the binary string. (5%)
3. Answer the following questions.  
(1) Find the 16’s and 15’s complement for the number  $(69CB.481)_{16}$ . (5%)  
(2) Using the IEEE single-precision floating-point representation (as shown in Fig. 1) to represent the number  $(65.A)_{16}$ . (5%)

Sign bit (1-bit)	Biased Exponent (8-bit)	Mantissa or Fraction(23-bit)
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Fig. 1 IEEE Single-Precision Floating-point format.

4. Answer the following questions.

- (1) What are the clock rate and the number of bits of the PCI interface standard? (4%)
- (2) What is the maximum data transmission rate of USB 2.0 standard? (4%)
- (3) What is the meaning of superscalar processor? (4%)
- (4) What is the read/write data rate for a 32X CD-ROM drive? (4%)
- (5) What is the meaning of DVD-SuperMulti? (4%)

5. (1) Explain the term "UML". (4%)

(2) Transfer the infix expression " $a * 3 + b - c \times e - d / a$ " into prefix and postfix expressions, respectively. (6%)

(3) Compare the differences between the two parameters propagation schemes: call-by-value and call-by-reference. (4%)

(4) Consider the C-code program as shown in Fig. 2. What are the values for  $x$  and  $y$  after running the program? According to the parameter propagation shown, is it a call-by-value or call-by-reference? (6%)

```
#include <stdio.h>
int main(void) {
    int x = 250, y = 400;
    swap(&x, &y);
    printf("%d %d\n", x, y);
    return 0;
}

void swap(int *i, int *j) {
    int temp;
    temp = *i;
    *i = *j;
    *j = temp;
}
```

Fig. 2 A C-code program.

注意：背面尚有試題

6. (1) What are the data rate and maximum distance of the 100baseTX and 10broad36? (4%)  
(2) Pick up the invalid ones from the following IP addresses: 140.123.17.65, 224.0.0.1, and 10.11.12.13 and explain the reason. (4%)  
(3) What is the maximum data rate for IEEE 802.11g? What is the IEEE standard for WiMAX? (4%)
7. Design a self-initialization counter with the counting sequence: **101** → **001** → **000** → **111** → **010** → **101** → **001** → ...
- (1) Plot the state transition diagram of the counter. (5%)  
(2) Derive the input equations for all flip-flops. (5%)