

國立彰化師範大學 100 學年度碩士班招生考試試題

系所：數學系

組別：丙組

科目：計算機概論（含資料結構）

☆☆請在答案紙上作答☆☆

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1. Please convert the following values to the dedicated Base: (10%)

(a) $(25.625)_{10} = (\quad)_2$

(b) $(123.4)_8 = (\quad)_{10}$

(c) $(10111.0101)_2 = (\quad)_8$

(d) $(C1B.D3)_{16} = (\quad)_2$

(e) $(124)_6 = (\quad)_{16}$

2. Answer the following questions: (15%)

(1) What is public key cryptography (PKC)?

(2) Please explain the purpose of RAID (Redundant Arrays of Inexpensive Disks).

(3) Please briefly describe the meaning and possible applications of “cloud computing”.

(4) The development process in the software lifecycle involves four phases: analysis, design, implementation and testing. For testing phase, please explain “glass-box testing” and “black-box testing”, respectively.

(5) For Internet, please present the applications of SMTP and POP3 protocols.

3. Please present the executing result for the following C program: (5%)

```
#include <stdio.h>
void main(void)
{ int prime[] = {2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47};
  int i=5;
  int *p;
  p=&prime[2];
  printf("1.=%d\n",prime[i]+2);
  printf("2.=%d\n",prime[i+2]);
  printf("3.=%d\n",prime[++i]);
  printf("4.=%d\n",prime[i++]);
  printf("5.=%d\n",*p+3);
}
```

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4. Assume the content of variable p is stored in the memory location "00EE16" and the pointer ptr1 is stored in the memory location "00EE12". What is the printing result of the following code? (10%)

```
#include <stdio.h>
int main(void)
{
    int p = 77;
    int *ptr1 = &p;
    int **ptr2 = &ptr1;
    printf("**ptr1 = %d\n", *ptr1);
    printf("&ptr1 = %X\n", &ptr1);
    printf("**ptr2 = %d\n", **ptr2);
    printf("*ptr2 = %X\n", *ptr2);
    printf("ptr2 = %X\n\n", ptr2);
    return 0;
}
```

5. The standard representation of a matrix is a two dimensional array. However for a sparse matrix as shown as follows, this standard representation wastes memory space. Please describe what data structure is more suitable to represent a sparse matrix. You can use the following figure to illustrate your answer. (10%)

$$\begin{bmatrix} 15 & 0 & 0 & 22 & 0 & -15 \\ 0 & 11 & 3 & 0 & 0 & 0 \\ 0 & 0 & 0 & -6 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 12 & 0 & 0 & 0 \end{bmatrix}$$

6. Assume that you are asked to write a program to transform the infix expressions, which may contain parentheses, into postfix ones.
- (a) Please write the "algorithm" or "pseudocode" of your program. (You can use any programming language such as C, C++, Java, and so on.)(10%)
- (b) Please transform the infix expression $(a+b)*d+e/(f+a*d)+c$ into postfix form. (5%)

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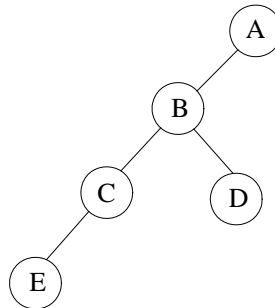
☆☆請在答案紙上作答☆☆

共 3 頁，第 3 頁

7. Please write the “pseudocode” to invert a singly linked list. (You can use any programming language such as C, C++, Java, and so on.) (10%)

8. (a) Please briefly describe what is a threaded binary tree? (4%)

(b) Please draw the threaded binary tree of the following binary tree. (6%)



9. Given the following graph, please write its

(a) adjacency matrix; (5%)

(b) adjacency list; (5%)

(c) adjacency multilists. (5%)

