國立台中教育大學 95 學年度大學日間部轉學招生考試

計算機概論（含程式設計、資料結構）　適用學系：資科系

一、選擇題（每題 2 分，共 50 分，25 題）

1.十進制的 12.25 轉換成二進制的表示法為何？
①110.01　②110.10　③1100.10　④1100.01

2.電腦系統內的浮點表示法，通常如何表示？
①浮點表示法=符號+指數+尾數　②浮點表示法=指數+尾數+符號
③浮點表示法=指數+符號+尾數　④浮點表示法=符號+尾數+指數

3.在邏輯運算中，只有在兩個運算元之值相異時，其結果才為真值的是下列哪一種運算？
①OR 運算　②AND 運算　③NOR 運算　④XOR 運算

4.試計算邏輯運算 (A+B) + (A’・B’) 的結果.
①0　②1　③-1　④不一定

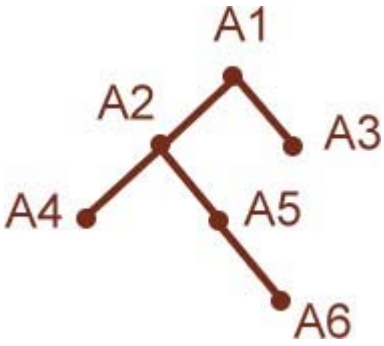
5.物件導向技術中的三大特性為何？
①封裝(encapsulation)、繼承(inheritance)、類別(class)
②封裝(encapsulation)、繼承(inheritance)、多元性(polymorphism)
③類別(class)，繼承(inheritance)，多元性(polymorphism)
④以上皆非

6.電腦執行一個指令，需完成哪些步驟(請依序列出)。
①提取指令，指令解碼，執行運算，提取運算元，存放結果。
②提取指令，指令解碼，提取運算元，執行運算，存放結果。
③提取指令，提取運算元，指令解碼，執行運算，存放結果。
④提取指令，執行運算，提取運算元，指令解碼，存放結果。

7.電腦指令定址(addressing)方法中的間接定址(indirect addressing)，其有效位址如何取得？
①有效位址即為運算元欄之值
②有效位址為運算元欄所指另一位址的內含值
③有效位址為運算元欄與 PC 內含值相加所得
④有效位址為運算元欄之值減去目前記數器內的值

8.Which of the following data structures are linear lists?
① tree　② queue　③ dynamic structures　④ static structures

9.Give the preorder traversal sequence of the following tree？



① A1, A2, A3, A4, A5, A6　② A1, A2, A4, A3, A5, A6
③ A1, A2, A4, A5, A3, A6　④ A1, A2, A4, A5, A6, A3

10.What is the result of FIB(7) based on the Fibonacci Sequence definition？

FIB(N) = N, if N=0 or N=1
FIB(N) = FIB(N-2) + FIB(N-1), if N >=2

① 8　② 13　③ 21　④ 34

11.C 語言描述下列何者錯誤？

① (x = = y)測試左右兩邊的值是否相等，表示 x 的值等於 y 的值的判斷式
② x =y 將 y 的值 assign 給 x
③ function 的 return data type 為 void 表示不傳回值，int 表示傳回型態為整數
④ %f 為輸出入格式化使用，表示 int 資料型態

12.下面程式片段使指標變數 P 指向一存儲型變數的動態存儲空間

int *P;　P =___ malloc(sizeof(int))；其中___應填入

① int　② int *　③ (*int)　④ (int *)

13. main() {
int i, x[3][3]={9, 8, 7, 6, 5, 4, 3, 2, 1}, *p=&xs[1][1];
for(i=0; i < 4; i = i+2) printf(“ %d ”, p[i]);
}

以上程式的輸出結果為:

① 5 2　② 5 1　③ 5 3　④ 9 7

14. int x=10,y=0;
if(x>=0)
if(x==0) y=1;
else y=-1;
printf("%d",y);

上列程式段的輸出結果為:

① 1　② 10　③ 0　④ -1

15.下列指令哪個不正確?

① a+x = x;　② a= a+x;　③ c = a%b;　④ z = z/y;

16.In IEEE 802.11, _____ provide access to the distribution system via the wireless medium for associated stations.

① access points　② base stations

③ coordination functions　④ data sets

17.If there are 200 nodes to be stored in a binary tree, the minimum height of the tree is

① 7　② 8　③ 9　④ greater than 10

18.At the Cyclic Redundancy Check (CRC) checker, _____ means that the data unit is damaged.

① a string of alternating 1s and 0s　② a nonzero remainder

③ a string of 0s　④ a string of 1s

19.The sequence to traverse a tree with **pre-order** traversal is ____.

①left sub-tree, right sub-tree, the node

②left sub-tree, the node, right sub-tree

③the node, left sub-tree, right sub-tree

④right sub-tree, left sub-tree, the node

20.The solution of the recurrence relation $T(2n) = 2T(n) + O(n)$, $T(2)=1$ is?

① O(n)　② O(nlogn)　③ $O(2^n)$　④ $O(n^2)$

21.The _____ holds the address of the next instruction to be executed.

① status register　② program counter

③ condition register　④ instruction register

22.Which of the following layer of the TCP/IP protocol hierarchy handles framing?

① data link　② physical　③ network　④ application

23.Assigning port numbers to programs and remembering which program goes with which port is a part of the _____ layer protocols.

① physical　② data link　③ network　④ transport

24.If a Turing machine program consists of the following four instructions: (1,0,1,2,R)→(1,1,0,2,R)→(2,0,0,2,R)→(2,b,b,2,L) then which of the following is a halting configuration?

① b 1 1 b b b ... (current state = 2, symbol 1 is being read),

② b 1 1 b b b ... (current state = 1, symbol 1 is being read),

③ b 1 0 b b b ... (current state = 1, symbol 0 is being read),

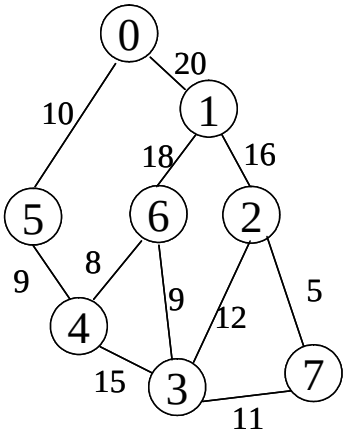
④ b 1 0 b b b ... (current state = 2, symbol 0 is being read).

25. Suppose the current state in a Turing machine is 1, and the current symbol is 0, and that (1,0,1,2,R) (1,0,0,3,L) both appear in the same collection of instructions. Then the machine _____.

① would proceed as normal
② has a conflict
③ would fix the problem and continue
④ would eliminate one of the instructions

二、問答及程式設計（每題 10 分，共 50 分，5 題）

1. Please describe the four compilation process steps and their functions in detail. (10 分)
2. 請利用 C/C++語言寫一個程式，該程式輸入兩個正整數，並輸出這兩個數字的最大公因數。(10 分)
3. Build a minimum cost spanning tree T by adding edges to T one at a time for the following graph. What is the time complexity? (10分)



4. Please correct the following C program segment: (10 分)

```
char str[80];
printf(“Please input your name”);
scanf(“%c”, &str);
printf(“your name is %s”, str);
```

5. Write a procedure for inserting a node from a binary search tree? (10 分)

國立台中教育大學 95 學年度大學日間部轉學招生考試

數學（含微積分、線性代數、離散數學）　適用學系：資科系

一、選擇題（每題 4 分，共 5 題，20 分）

（　）1. 設 $\vec{a}=(\cos 18°,\sin 18°),\vec{b}=(\cos 138°,\sin 138°),\vec{c}=(\cos 258°,\sin 258°)$, 試求 $\vec{a}+\vec{b}+\vec{c}=?$　(A) $\left(\frac{1}{2},\frac{\sqrt{3}}{2}\right)$ (B) $\left(\frac{\sqrt{3}}{2},\frac{1}{2}\right)$ (C) $(1,0)$ (D) $(0,0)$

（　）2. 求 $\lim_{n\to\infty}\int_0^1\left(x^2+\frac{1}{2}x^3+\frac{1}{3}x^4+\Lambda+\frac{1}{n}x^{n+1}\right)dx=?$ (A) $\frac{1}{4}$ (B) $\frac{2}{4}$ (C) $\frac{3}{4}$ (D) 1

（　）3. 設 $f(x)=\sqrt{2+\sqrt{2+\sqrt{x}}}$，試求 $f'(4)=?$ (A) $\frac{1}{64}$ (B) $\frac{1}{32}$ (C) $\frac{1}{16}$ (D) 1

（　）4. 若 $f\left(\frac{x-1}{x^2+1}\right)=x$，試求 $f'(-1)=?$ (A) -2 (B) 1 (C) 0 (D) 3

（　）5. 試求 $\sum_{k=1}^{999}\frac{1}{\sqrt[3]{(k+1)^2}+\sqrt[3]{(k+1)k}+\sqrt[3]{k^2}}$ 之值為何？ (A) 7 (B) 8 (C) 9 (D) 10

二、計算、證明及繪圖題（共 80 分）

1. 令 $W_1=\left\{[x_1\ x_2\ x_3\ x_4]\in\mathbf{R}^{1\times 4}\,\middle|\,x_1-x_3-x_4=x_1+x_2-2x_3-x_4=0\right\}$
$W_2=\left\{[x_1\ x_2\ x_3\ x_4]\in\mathbf{R}^{1\times 4}\,\middle|\,x_1-x_2=x_2-x_3=x_3-x_4=0\right\}$，則

$\dim(W_1+W_2)=$（　　）（5 分）

2. 令矩陣 $A=\begin{bmatrix}1&8&1&2\\2&7&4&3\\3&6&5&6\\4&5&8&7\end{bmatrix}$ 且其特徵值為 λ_i $(i=1,2,3,4)$，則

$\lambda_1\lambda_2+\lambda_1\lambda_3+\lambda_1\lambda_4+\lambda_2\lambda_3+\lambda_2\lambda_4+\lambda_3\lambda_4=$（　　）（5 分）

3. 令 $A=\begin{bmatrix}5&-6&-6\\-1&4&2\\3&-6&-4\end{bmatrix}$，則其最小多項式(minimal polynomial)為（　　）(5 分)

4. 若 $A = R$ 且定義二元運算 $\bullet$ 為 $a \bullet b = a + b - 3$，則 a 的反元素 $a^{-1} =$ (　　) (5 分)

5.請找出下面聯立非齊次線性方程組 (non-Homogeneous linear equations) 的所有解。(10 分)

$$2x_1 - x_2 - 3x_3 = 1$$
$$x_1 - x_2 + 2x_3 = -2$$
$$4x_1 - 3x_2 + x_3 = -3$$
$$x_1 - 5x_3 = 3$$

6.Find a Jordan canonical form and a Jordan basis (10 分)

$$\text{forB} = \begin{bmatrix} 2 & 5 & 0 & 0 & 0 \\ 0 & 2 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 & -1 \\ 0 & 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & 0 & -1 \end{bmatrix},$$

(a)a Jordan canonical form **J** forB

(b)a Jordan basis forB

(c) Find P, such that **J**=P^{-1}BP

7. Prove by induction or otherwise that $4^{2n} - 1$ is a multiple of 15 for all natural numbers n. (10 分)

8. Let A be a square matrix. Prove that if λ is an eigenvalue of A, then λ^2 is an eigenvalue of the matrix A^2 . (10 分)

9.一個有限狀態機(finite state Machine) (10 分)

M＝{S,I,o,v,w}，S＝{ S_0，S_1}為機器內部狀態集 (Set of internal states for M)；

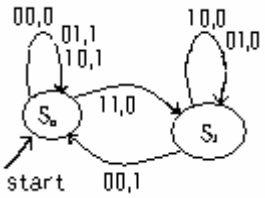
I＝{00,01,10,11}為機器設定可接受輸入的字碼集(input alphabet form)；

o＝{0,1}為機器設定可接受輸出的字碼集(output alphabet form)；v 為機器內部狀態函數(next state function)，v：s×I→S；w 為機器輸出函數(output function)，w: s×I→0，今知：其內部狀態表如下：

	V				W			
	00	01	10	11	00	01	10	11
S_0	S_0	S_0	S_0	S_1	0	1	1	0
S_1	S_0	S_1	S_1	S_1	1	0	0	1

請畫出其內部狀態圖：

參考答案：



10.Draw all the non-isomorphic rooted tree with four vertices。 (10 分)