國立中正大學
113學年度碩士班招生考試
試 題

[第1節]

科目名稱	計算機概論
系所組別	資訊管理學系－甲組 乙組
	資訊管理學系醫療資訊管理

－作答注意事項－

※作答前請先核對「試題」、「試卷」與「准考證」之系所組別、科目名稱是否相符。

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3. 入場後於考試開始40分鐘內不得離場。

4. 全部答題均須在試卷（答案卷）作答區內完成。

5. 試卷作答限用藍色或黑色筆（含鉛筆）書寫。

6. 試題須隨試卷繳還。

[Section I] Multiple Choice (70 points)

Choose ONE answer only for each question (2 points for each question)

1. The binary representation of 28-10 is:

A. 10000　　　　　B. 10001　　　　　C. 10010　　　　　D. 10011

2. The binary notation of 66.375 is:

A. 1000100.111　　B. 1000100.101　　C. 1000010.101　　D. 1000010.011

3. Which of the following has the lowest access speed?

A. main memory　　B. hard disk　　　C. cache　　　　　D. register

4. The technique to consolidate multiple signals into a single composite signal is called:

A. multiplexing　　B. pipelining　　C. multiprocessing D. multitasking

5. The following processes arrive for execution at the times indicated. Each process will run the listed amount of time. Suppose the non-preemptive shortest job first (SJF) scheduling algorithm is used, what is the average waiting time for these processes?

Process	Arrival Time	Burst Time
P1	0	8
P2	1	5
P3	2	2

A. 4.67　　　　　　B. 5.00　　　　　C. 5.33　　　　　D. 5.67

6. Following the question above. What is the average turnaround time for these processes?

A. 9.00　　　　　　B. 9.33　　　　　C. 9.67　　　　　D. 10.00

7. Which of the following has the worst space efficiency?

A. RAID 0　　　　　B. RAID 1　　　　C. RAID 3　　　　D. RAID 5

8. Each time the dispatcher awards a time slice to a process, it initiates a timer circuit that will indicate the end of the slice by generating a signal called:

A. interrupt　　　　B. signaling I/O　　C. deadlock　　　　D. spinlock

9. How many IP addresses are in a class B network?

A. 254　　　　　　B. 256　　　　　　C. 65534　　　　　D. 65536

10. Which of the following connects two bus networks?

A. switch　　　　B. access point　　　C. repeater　　　　D. all of the above

11. Which of the following refers to a small piece of data sent from a website and stored on the user's computer by the user's web browser while the user is browsing so as to remember stateful information?

A. etag　　　　　B. proxy　　　　　C. cookie　　　　　D. register

12. The application layer protocol of LINE is:

A. HTTP　　　　B. SMTP　　　　C. SNMP　　　　　D. VoIP

13. Which of the following is polynomially bounded?

A. $100^{\log n}$　　　B. 2^n　　　　C. n^n　　　　D. all of the above

14. The worst time complexity of quick sort is:

A. $O(n)$　　　　B. $O(n\log\log n)$　　C. $O(n\log n)$　　　D. $O(n^2)$

15. The average time complexity of insertion sort is:

A. $O(n\log\log n)$　　B. $O(n\log n)$　　C. $O(n^2)$　　　D. $O(n^2\log n)$

16. What is the printed value of the following code?
```
sum=0;
for(int i=1; i<=8; ++i)
        sum+=i;
cout << sum << endl;
```
A. 32　　　　　　B. 36　　　　　　C. 0　　　　　　D. 40320

17. What is the value of arr[5] of the following code?
```
int arr[10];
for(int i=0; i<10; ++i)
        arr[i]=0;
for(int i=0; i<10; ++i)
        if (i==5)
                continue;
        arr[i]=i*i;
```
A. 0
B. 5
C. 25

D. 36

18. What is the printed value of the following code?

```
int arr[10];
for(int i=0; i<10; ++i)
        arr[i]=i*i;
        if(i%3==1)
                cout << arr[i] << " ";
        if(i==5)
                break;
cout << endl;
```

A. 1 16
B. 0 1 4 9 16
C. 1 16 49
D. 0 1 4 9 16 25 36 49 64 81

19. _____ allows one class to encompass the properties of another.

A. encapsulation　　B. polymorphism　　C. inheritance　　　D. interface

20. The way to give the function direct access to the actual parameters by telling it the addresses of the actual parameters in the calling program unit is called _____.

A. call by value
B. call by reference
C. fruitful function
D. all of the above

21. A problem occurred during a program's execution is called _____.

A. compile error　　B. syntax error　　　C. exception　　　D. none of the above

22. Given $T(n)=2T(n/2)+1$, $T(0)=0$, $T(1)=1$, $T(n)=$?

A. $\Theta(\log n)$　　　　B. $\Theta(n)$　　　　　C. $\Theta(n \log\log n)$　　　D. $\Theta(n \log n)$

23. Given $T(n)=2T(n/2)+\log n$, $T(0)=0$, $T(1)=1$, $T(n)=$?

A. $\Theta(\log^2 n)$　　　　B. $\Theta(\log n \log\log n)$　　C. $\Theta(n)$　　　　D. $\Theta(n \log n)$

24. Which of the following has the lowest complexity?

A. 100!　　　　　B. $2^{\log n}$　　　　　C. n　　　　　　D. $4^{\log n}$

25. Given a binary search tree. The inorder and postorder traversal of this tree are 1,3,5,7,9,11,13 and 1,5,3,7,13,11,9, respectively. What is the preorder traversal of this tree?

A. 9,7,3,1,5,13,11

B. 9,7,3,1,5,11,13

C. 9,7,3,5,1,13,11

D. 9,7,3,1,5,11,13

26. Given a binary tree with 16 nodes, and it has 3 nodes with degree 1. How many leafs in this tree?

A. 5 　　　　B. 6 　　　　C. 7 　　　　D. 8

27. In the relational database, a column in a relation is called ____.

A. dictionary 　　B. item 　　C. tuple 　　D. attribute

28. Which of the following extracts columns from a relation?

A. SELECT 　　B. PROJECT 　　C. CHOOSE 　　D. JOIN

29. Which of the following is not an animation software?

A. 3ds Max 　　B. TensorFlow 　　C. Maya 　　D. all of the above

30. The ____ model is a RNN model.

A. LSTM 　　B. VGG16 　　C. FaceNet 　　D. actor-critic

31. The ____ model is not for reinforcement learning.

A. GRU 　　B. DQN 　　C. DDPG 　　D. PPO

32. Which of the following is not a branch of machine learning?

A. unsupervised learning

B. particle swarm optimization

C. reinforcement learning

D. all of the above

33. Which of the following is a non-computable problem?

A. traveling salesman problem

B. clique problem

C. subset sum problem

D. halting problem

34. Which of the following is a NP-complete problem?

A. depth-first-search problem

B. spanning tree problem

C. all-pairs-shortest-path problem

D. 0/1 knapsack problem

35. Which of the following is not a NP-complete problem?

A. all-pairs-shortest-path problem

B. 0/1 knapsack problem

C. traveling-salesman problem

D. clique problem

[Section II] Problems and Calculations (30 points)

1. Convert the Hexadecimal number $(6F)_{16}$ into the following carry number:

(a) (3 pts) Octal number

(b) (3 pts) Decimal number

2. (6 pts) Please use the do-while loop in C/C++ to calculate the product of integers from 1 to 10.

3. (6 pts) Given 6 data 6,5,2,3,4,1, write the result of each iteration in insertion sort (in ascending order).

4. (6 pts) Given a binary tree with 32 nodes, write its maximal and minimal height.

5. (6 pts) What is the relationship between artificial intelligence, machine learning, and deep learning?

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試 題

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系所組別	資訊管理學系-甲組

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總共 4 大題，每大題 25 分

1. Regarding the impact of information systems (IS) on organizations, please
   a. Describe the major economic and behavioral theories that help explain how IS affect organizations. (15 分)
   b. Describe the impact of artificial intelligence on organizations. (10 分)

2. Regarding the information Technology (IT) infrastructure, please
   a. Define IT infrastructure and describe the components of IT infrastructure that firms need to manage. (15 分)
   b. Describe the management challenges posed by IT infrastructure. (10 分)

3. Regarding the security of information systems, please
   a. Describe the challenges presented in securing wireless networks. (15 分)
   b. Define identity theft and phishing and explain why identity theft is such a big problem today. (10 分)

4. Regarding enterprise applications, please
   a. Describe the challenges posed by enterprise applications and how these challenges can be addressed. (15 分)
   b. Describe how business intelligence features can be used in enterprise applications. (10 分)

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試 題

[第2節]

科目名稱	資料結構
系所組別	資訊管理學系-乙組

―作答注意事項―

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1. If n is 8, then what the variable space requirement of this program is? (6 pt)

```
float sum(float list[ ], int n)
{
    float tempsum = 0;
    for (int i = 0; i<n; i++)
        tempsum += list[i];
    return tempsum;
}
```

2. Calculate the total steps of the following function (6 pt)

```
float rsum(float list[ ], int n)
{
 if (n)
        return rsum(list, n-1) + list[n-1];
 return list[0];
}
```

3. Please transform the expressions from prefix to postfix. (12 pt)

   (A)   -+-/abc*de*ac

   (B)   -/*a+bcdg

4. Which(s) is/are true in the following descriptions? (24 pt)

   (A) &a->val means (&a)->val

   (B) The worst-case complexity of the maze is O(*mp*), where *m* and *p* are the number of rows and columns of the maze respectively.

   (C) a%b*c==3 means (a%(b*c))==3

   (D) a==3 || b==4 && c==5 means ((a==3) || (b==4)) && (c==5)

   (E) The time complexity of O(2^n) is higher than O(*n*!).

   (F) Prefix notation requires the use of parentheses to indicate the precedence of operands.

5. The following is a circular queue. Please find and correct the errors. (12 pt)

```
element deleteq()
{
    element item;     /* hint: MAX_QUEUE_SIZE */
    front = front+1;
    if (front == rear)
        return queueEmpty( );
    return queue[front];
}
```

6. Please complete the code of function invert to perform the action for "Invert single linked list". (20 pt)

```
typedef struct list_node *list_pointer;
typedef struct list_node {
    char data;
    list_pointer link;
};

list_pointer invert(list_pointer lead)
{
    list_pointer middle, trail;
    middle = NULL;
    while (.......) {
        .......
        .......
        .......
        .......
    }
    return middle;
}
```

7. If the order of moving is as follows (left graph), please draw the maze path in the right graph (where 1 is blocked path and 0 is through path). (20 pt)

```
        2
    3   N   1
  4 W       E 0
    5   S   7
        6
```

entrance →

0	0	0	0	0
0	0	1	1	1
0	0	0	0	0
0	1	0	1	0
0	0	0	0	0

exit →