國立中山大學108學年度
碩士暨碩士專班招生考試試題

科目名稱：管理資訊系統【資管系碩士班甲組】

－作答注意事項－

考試時間：100分鐘

- **考試開始響前不得翻閱試題，並不得書寫、劃記、作答。**請先檢查答案卷（卡）之應考證號碼、桌角號碼、應試科目是否正確，如有不同立即請監試人員處理。
- **答案卷限用藍、黑色筆(含鉛筆)書寫、繪圖或標示**，可攜帶橡皮擦、無色透明無文字墊板、尺規、修正液（帶）、手錶(未附計算器者)。每人每節限使用一份答案卷，不得另攜帶紙張，請衡酌作答。
- 答案卡請以2B鉛筆劃記，不可使用修正液（帶）塗改，未使用2B鉛筆、劃記太輕或污損致光學閱讀機無法辨識答案者，其後果由考生自行負擔。
- 答案卷（卡）應保持清潔完整，不得折疊、破壞或塗改應考證號碼及條碼，亦不得書寫考生姓名、應考證號碼或與答案無關之任何文字或符號。
- 可否使用計算機請依試題資訊內標註為準，如「可以」使用，廠牌、功能不拘，唯不得攜帶具有通訊、記憶或收發等功能或其他有礙試場安寧、考試公平之各類器材、物品（如鬧鈴、行動電話、電子字典等）入場。
- **試題及答案卷（卡）請務必繳回，未繳回者該科成績以零分計算。**
- **試題採雙面列印，考生應注意試題頁數確實作答。**
- **違規者依本校招生考試試場規則及違規處理辦法處理。**

國立中山大學108學年度碩士暨碩士專班招生考試試題

科目名稱：管理資訊系統【資管系碩士班甲組】　　題號：442003

※本科目依簡章規定「不可以」使用計算機(問答申論題)　　共1頁第1頁

1. 電子商務的行銷架構中，有所謂的4P模式，何謂4P模式？電子商務最主要的行銷策略有哪些？馬雲曾於2016年阿里巴巴雲棲大會中提出，「未來10年20年之後沒有電子商務只有新零售」，何謂新零售？(25%)

2. 未來的企業經營模式將會是整合所有通路，非常豐富多樣化的商業經營模式，這也是商業4.0的最終精神，這包括了虛實整合、O2O整合及SoLoMo整合，請分別解釋並以例子說明以上這三種整合。(15%)

3. 現在電商平台與社群平台，為了提供客製化、個人化的購物及使用經驗，紛紛大量收集用戶資料用以分析，如淘寶的千人千面推薦系統或是臉書廣告投送，這麼作的話，有什麼優缺點呢？試分析之。(10%)

4.請說明物聯網（Internet of Things）未來主要的應用有那幾大項？各有何種應用?請列舉說明，此外，請分析物聯網未來面臨的主要挑戰為何？（25%）

5.一個資管人員最重要的天職，就是要讓資訊系統能夠成功地引進到企業，不管現在資訊科技變化的情況與速度如何，資訊系統的引進都是一個很複雜的組織變革問題，身為一個資管人員，請問你認為在資訊系統引進企業時，會有哪些構面的因素會影響系統引進的成敗？請列舉詳細說明之。（25%）

試題請隨卷繳回

國立中山大學108學年度
碩士暨碩士專班招生考試試題

科目名稱：資料結構【資管系碩士班乙組】

—作答注意事項—

考試時間：100分鐘

- **考試開始響前不得翻閱試題，並不得書寫、劃記、作答。**請先檢查答案卷（卡）之應考證號碼、桌角號碼、應試科目是否正確，如有不同立即請監試人員處理。
- **答案卷限用藍、黑色筆(含鉛筆)書寫、繪圖或標示，**可攜帶橡皮擦、無色透明無文字墊板、尺規、修正液（帶）、手錶(未附計算器者)。每人每節限使用一份答案卷，不得另攜帶紙張，請衡酌作答。
- 答案卡請以2B鉛筆劃記，不可使用修正液（帶）塗改，未使用2B鉛筆、劃記太輕或污損致光學閱讀機無法辨識答案者，其後果由考生自行負擔。
- 答案卷（卡）應保持清潔完整，不得折疊、破壞或塗改應考證號碼及條碼，亦不得書寫考生姓名、應考證號碼或與答案無關之任何文字或符號。
- 可否使用計算機請依試題資訊內標註為準，如「可以」使用，廠牌、功能不拘，唯不得攜帶具有通訊、記憶或收發等功能或其他有礙試場安寧、考試公平之各類器材、物品（如鬧鈴、行動電話、電子字典等）入場。
- **試題及答案卷（卡）請務必繳回，未繳回者該科成績以零分計算。**
- **試題採雙面列印，考生應注意試題頁數確實作答。**
- **違規者依本校招生考試試場規則及違規處理辦法處理。**

國立中山大學108學年度碩士暨碩士專班招生考試試題

科目名稱：資料結構【資管系碩士班乙組】　　題號：442002

※本科目依簡章規定「不可以」使用計算機(問答申論題)　　共2頁第1頁

1. (10%) The complexity and stability of sorting algorithms. (2% for each sorting algorithm)

	Best Case	Average Case	Worst Case	Stable
Bubble Sort	O(n)	$O(n^2)$	$O(n^2)$	yes
Insertion Sort				
Selection Sort				
Quick Sort				
Merge Sort				
Heap Sort				

2. Consider a binary tree T whose preorder and inorder traversal sequences are as follows.
   Preorder: F,B,A,D,C,E,G,I,H.
   Inorder: A,B,C,D,E,F,G,H,I.
   A. Please show the postorder traversal sequence of T. (5%)
   B. Please show the level-order traversal sequence of T. (5%)

3. Consider a sequence of keys: 9,4,8,7,12,15,3,5,14,18 for inserting into a heap.
   A. Please draw the result after inserting all these keys into an empty min heap. (5%)
   B. Following A, please draw the result after deleting the root. (5%)

4. Consider a sequence of keys 5,19,23,13,7,17,3,2,11. Please draw the result after inserting all these keys into an empty AVL tree. (8%)

5. A complete binary tree B containing 100 nodes (with indices 1, 2, …, 100) is stored in an array. Let node *i* be in position *i* of the array (array[0] is empty).
   A. What is the height of tree B? (4%)
   B. What is the index of **the parent** of array[71]? (4%)
   C. How many nodes are leaf nodes? (4%)

6. (12%) Consider the following recursive program:

```
Public int fact(int a, int b)
{
  If (a%b == 0) return b;
  else return fact(b, a%b);
}
```

(1) What is the output given by fact(17, 3)? (4%)
(2) What is the output given by fact(3, 9) ? (4%)
(3) Explain briefly the purpose of the fact function. (4%)

試題請隨卷繳回

國立中山大學108學年度碩士暨碩士專班招生考試試題

科目名稱：資料結構【資管系碩士班乙組】　　題號：442002

※本科目依簡章規定「不可以」使用計算機(問答申論題)　　

7. (15%) For a given graph $G = (V, E)$, arbitrarily partition the nodes V into two disjoint sets, V_1 and V_2. Let E_1 be all the edges such that both nodes in the edge are in V_1, E_2 be all edges such that both nodes are in V_2, and E_3 be all edges (u, v) such that $u \in V_1$ and $v \in V_2$. If we construct a minimum spanning tree T_1 on graph (V_1, E_1) and a minimum spanning tree T_2 on (V_2, E_2), then connect T_1 and T_2 on the lowest-weighted edge connecting T_1 and T_2. Will the connected result be a minimum spanning tree of G? Proof the above method if it is correct, or give a counterexample.

8. (15%)

(a) For a directed graph $G = (V, E)$, $V = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $E = \{(1, 2), (1, 4), (1, 5), (2, 3), (2, 4\}$, $(2, 5), (2, 6), (3, 5), (3, 6), (4, 7), (4, 8), (5, 4), (5, 7), (5, 8), (6, 5), (6, 8), (6, 9), (8, 7), (9, 5), (9, 8)\}$, and each (u, v) indicates an arc from vertex u to vertex v. Assume the adjacency lists are in sorted order: for example, when iterating through the arcs pointing from 1, consider the arc 1→2 before 1→4, 1→5. Run *Depth-First Search*, starting at vertex 1. Complete the list of vertices in the order they are first discovered by DFS: 1 2 3 _ _ _ _ _ _. (5%)

(b) For the same graph G, run *Breadth-First Search*, starting at vertex 1. Complete the list of vertices in the order in which they are enqueued: 1 2 4 5 _ _ _ _ _. (5%)

(c) Consider two vertices m and n that are simultaneously on the function-call stack at some point during the execution of depth-first search from vertex s in a digraph. Which of the following must be true? (5%)

(I) There is both a directed path from s to m and a directed path from s to n.

(II) If there is no directed path from m to n, then there is a directed path from n to m.

(III) There is both a directed path from m to n and a directed path from n to m.

9. (8%) For each of the following scenarios, give the "best" data structure or a combination of data structures, for example, an unsorted array, linked list, doubly linked list, circular linked list, stack, or queue. In each case, justify your answer briefly.

(a) Suppose that a shop decided that customers who come first will be served first. (2%)

(b) A list must be maintained so that any element can be accessed randomly. (2%)

(c) A program needs to remember operations it performed in opposite order. (2%)

(d) The size of a file is unknown. The entries need to be entered as they come in. Entries must be deleted when they are no longer needed. It is important that structure has flexible memory management. (2%)

國立中山大學108學年度
碩士暨碩士專班招生考試試題

科目名稱：計算機概論【資管系碩士班甲組、乙組】

—作答注意事項—

考試時間：100分鐘

- **考試開始響前不得翻閱試題，並不得書寫、劃記、作答。**請先檢查答案卷（卡）之應考證號碼、桌角號碼、應試科目是否正確，如有不同立即請監試人員處理。
- **答案卷限用藍、黑色筆(含鉛筆)書寫、繪圖或標示**，可攜帶橡皮擦、無色透明無文字墊板、尺規、修正液（帶）、手錶(未附計算器者)。每人每節限使用一份答案卷，不得另攜帶紙張，請衡酌作答。
- 答案卡請以2B鉛筆劃記，不可使用修正液（帶）塗改，未使用2B鉛筆、劃記太輕或污損致光學閱讀機無法辨識答案者，其後果由考生自行負擔。
- 答案卷（卡）應保持清潔完整，不得折疊、破壞或塗改應考證號碼及條碼，亦不得書寫考生姓名、應考證號碼或與答案無關之任何文字或符號。
- 可否使用計算機請依試題資訊內標註為準，如「可以」使用，廠牌、功能不拘，唯不得攜帶具有通訊、記憶或收發等功能或其他有礙試場安寧、考試公平之各類器材、物品（如鬧鈴、行動電話、電子字典等）入場。
- **試題及答案卷（卡）請務必繳回，未繳回者該科成績以零分計算。**
- **試題採雙面列印，考生應注意試題頁數確實作答。**
- **違規者依本校招生考試試場規則及違規處理辦法處理。**

國立中山大學108學年度碩士暨碩士專班招生考試試題

科目名稱：計算機概論【資管系碩士班甲組、乙組】　　題號：442001

※本科目依簡章規定「不可以」使用計算機（選擇題）　　

單選題(每題 2.5 分)

1. Which one is the biggest, when n approaches to ∞ ?
   A. nlogn
   B. $n^{logn/loglogn}$
   C. $n^{\sqrt{logn}}$
   D. n^{100}

2. Which of the following statements about malware is FALSE?
   A. A computer might be infected without connecting to a network
   B. Malware might not be an executable file
   C. If a machine in a LAN has been infected, the machines in the same LAN might be infected.
   D. Browsing URLs will not get infected by malware

3. A CPU performs instruction execution by fetch-decode-execute-store cycle. Which component executes the instruction?
   A. CU
   B. ALU
   C. IR
   D. MAR

4. Which of the following statements about cryptography is FALSE?
   A. Symmetric encryption system requires one secret key to perform encryption and decryption
   B. Asymmetric encryption system requires one key pair to perform encryption and decryption
   C. With the knowledge of a public key, it is hard to know the associated private key
   D. Symmetric encryption system can provide digital signature functionality

5. Which of the following statements is FALSE?
   A. ARP is used for finding the MAC address of an IP address, so ARP is a protocol over IP
   B. DNS queries are transmitted through UDP
   C. FTP responses are transmitted through TCP
   D. HTTP requests and responses are transmitted through TCP

6. Which of the following layers does not belong to TCP/IP protocol stack?
   A. Data link layer
   B. Network layer
   C. Transport layer
   D. Presentation layer

7. Which of the following statements about network mask is FALSE?
   A. The first bit of a network mask must be 1
   B. The lowest bit of a network mask must be 0
   C. The length of a network mask may be vary depending on the number of subnets
   D. The default network subnet mask of a class C network address is 255.255.255.0

8. Assume that there is a three-frame physical memory in the system. Given the reference string ***abcgabadbcabacd***, how many page faults are generated if LRU is used? (Initially, all frames are empty.)
   A. 9
   B. 10
   C. 11
   D. 12

9. Which of the following statements about deadlock is FALSE?
   A. Deadlock will not happen if all the resources can be preemptive.
   B. Resource allocation graph is used to represent the system state.
   C. A circle in a resource allocation graph indicates deadlock.
   D. Deadlock will slow down the system performance.

10. Which of the following statements about TCP is TRUE?
   A. Congestion control ensures that sender won't overflow receiver's buffer by transmitting too much or too fast.
   B. The receiver side of a TCP connection maintains a buffer storing the data received; the sender side has a buffer, too.
   C. Round-trip time (RTT) is computed based on the size of sliding window.
   D. Long retransmission timeout (RTO) indicates high transmission rate

11. A binary operation on non-empty binary strings is defined as follows. To obtain $s \,¤\, s'$, take s and replace its last symbol with the last symbol of s'. For example, we have 01001¤110 = 01000. Which of the following statements is true?
   A. This operation is associative
   B. This operation is commutative
   C. 010010¤1111110 = 0100010
   D. None of the above

12. Which of the following statements about cloud computing is FALSE?
   A. Cloud computing is a type of distributed network environments
   B. SaaS (Software as a Service) is a type of business models in cloud computing
   C. Google's Gmail is an example of SaaS
   D. IaaS is the most inefficient business model

13. Which of the following statements about TLS/SSL is FALSE?
   A. TLS/SSL is a security protocol that provides end-to-end communication security over TCP.
   B. TLS/SSL applies asymmetric cryptography to ensure user authentication
   C. TLS/SSL applies asymmetric cryptography to encrypt transmitted data
   D. HTTPS is a security protocol over TLS/SSL

14. Which of the following statements about bootstrap is FALSE?
    A. A bootstrap is the program which resides in ROM
    B. A bootstrap is to initialize the operating system during startup
    C. A mobile phone does not require a bootstrap during its startup
    D. A bootstrap is a loader which loads the kernel into RAM

15. Which of the following statements about computer hardware is FALSE?
    A. All I/O devices use a common device controller to communicate with the operating system
    B. I/O devices are peripherals of a computer system
    C. Port is a pathway for an external devices to go into or out of the computer
    D. RAM is not a peripheral device for a computer

16. Which of the following statements about the binary numeral system is FALSE?
    A. Two's complement of 36 is 1011011
    B. It requires N+2 bits to represent -2^N in one's complement
    C. An N-bit two's complement numeral system can represent integers in the range of -2^{N-1} to $2^{N-1}-1$.
    D. Two's complement is adding one to one's complement

17. Which of the following statements is FALSE?
    A. Multiprogramming indicates that there are multiple processes residing in memory
    B. Multiprocessing system refers that there are multiple CPUs within a computer system.
    C. A computer system with a single CPU cannot achieve multiprogramming ability
    D. Multiprogramming can improve CPU utilization

18. Let $G(V, E)$ be a directed graph, where V is the set of nodes; E is the set of edges and is represented in a matrix. What is the time complexity of finding the shortest path for all the pairs of two nodes?
    A. $O(|V|^2)$
    B. $O(|V|^3)$
    C. $O(|E|^3)$
    D. $O(|V|)$

19. What is the math representation of the prefix – A + * / B C D E ?
    A. A–B/C*D+E
    B. A–B*C/D+E
    C. A+E–B*C/D
    D. A-E+B*C/D

20. Given a piece of code below. What is the value of the variable *w*?

```
w = 0;
for (i = 0; i <= 5; i++)
    for (j = 0; j <= i; j++)
        w = w + 2;
```

    A. 30
    B. 32
    C. 40
    D. 42

21. Which of the following about Apache Hadoop Distributed File System (HDFS) is FALSE?
A. It is often used as an implementation of "data lake".
B. The data/slave node(s) keeps track of the locations of data blocks.
C. Data blocks are usually saved in the data/slave nodes.
D. Its block size is normally larger than the sizes of typical file systems.

22. Which of the following is NOT a common Deep Learning Framework?
A. Tensorflow
B. MXNet
C. OpenCL
D. PyTorch

23. Which of the following is NOT a common limitation or challenge of Deep Learning?
A. A trained model is generally considered a "black-box"
B. It usually needs massive computation
C. It requires a lot of feature engineering
D. It takes time to identify better model structures and parameters

24. Which of the following about recent trends in Big Data Analytics is FALSE?
A. The adoption of "data lake"
B. The rise of heterogeneous computing
C. The popularization of in-memory analytics
D. The downfall of relational database systems

25. Which of the following is NOT a Massively Parallel Processing (MPP) analytical database system.
A. Vertica
B. Aster
C. Greenplum
D. MongoDB

26. Which of following C statements should appear in a function that adds a node to the end of an existing non-empty linked list. Suppose *newPtr* is a pointer to the new node to be added, and *lastPtr* is a pointer to the current last node. Each node contains a link to a node, *nextPtr*.
A.
```
lastPtr = newPtr;
lastPtr->nextPtr = newPtr;
```
B.
```
newPtr->nextPtr = lastPtr;
lastPtr = newPtr;
```
C.
```
lastPtr->nextPtr = lastPtr;
newPtr = lastPtr;
```
D.
```
lastPtr->nextPtr = newPtr;
lastPtr = newPtr;
```

27. Which of the following SQL statements gives all account(s) 2% interest if the balance is higher than 50,000?
A. UPDATE account a SET a.balance = a.balance * 1.02 WHERE a.balance > 50000
B. UPDATE account a SET a.balance += a.balance * 1.02 IF a.balance > 50000
C. UPDATE balance a SET a.balance = a.balance * 1.02 WHERE a.balance > 50000
D. UPDATE balance a SET a.balance += a.balance * 1.02 IF a.balance > 50000

28. In C programming language, we can pass a C structure to a function by passing
A. Structure members
B. Entire structure
C. A pointer to a structure
D. All of the above

29. Let's say we accidentally print elements out of bounds of a C array, which of the following will be the output?
A. All the elements of the array
B. Syntax error
C. Nothing
D. Some junk values

30. In Python 3, which of the following statements is used in the tasks of multiple-selections?
A. if … elif … else
B. switch
C. if
D. if … else

31. What is the output of the following C program?

```
#include <stdio.h>
int main() {
  int k , n = 20;
  k = (n > 5 ? (n <= 10 ? 10: 20) :50);
  printf("%d\n", n);
  return(0);
}
```

A. 10
B. 20
C. 50
D. 5

32. Which of the following statements is FALSE?
A. Arrays are dense data structures.
B. Data elements in a linked list need not be stored in an adjacent space in memory.
C. C Pointer can be used to store the next data element of a linked list.
D. Linked list is a collection of nodes that contain information and links to other nodes.

33. Which of the following is usually NOT considered a functional programming language?
A. R
B. Scala
C. Haskell
D. Java

34. Which of the following is usually considered a kind of structured data?
A. XML files
B. Tabular data in relational databases
C. Text in emails
D. Image files

35. Suppose we have a list of customer names already sorted in alphabetical order and stored in one of the following data structures. The easiest way to print the names in reverse alphabetical order is to use a
A. Stack
B. Binary Search Tree
C. Queue
D. Linked List

36. Which of the following primitive data types of C/C++/Java should NOT be used to control a counting loop?
A. double
B. int
C. long
D. short

37. Which of the following bitwise operations is generally used to turn off a particular bit in a number?
A. AND
B. OR
C. NOT
D. XOR

38. In C/C++, unless explicitly specified, entire arrays are passed _____ and individual array elements are passed _____.
A. by-value, by-reference
B. by-reference, by-reference
C. by-value, by-value
D. by-reference, by-value

39. Consider the following tables, A and B, in a relational database.

A:

ID	V
1	A
3	X
5	C

B:

ID	V
3	X
5	Y
6	Z

How many rows and columns in the output after running the following SQL query?

SELECT * FROM
(SELECT * FROM A UNION ALL SELECT * FROM B) WHERE ID > 3

A. 3 rows and 2 columns
B. 3 rows and 3 columns
C. 2 rows and 2 columns
D. 2 rows and 3 columns

40. C/C++ pointers are variables that contain _____ as their values.
A. strings
B. characters
C. memory addresses
D. linked lists