國立政治大學　106　學年度 碩士班 招生考試試題

考試科目	計算機概論 4161	系所別	資訊管理學系/資管組	考試時間	2 月 18 日(六) 第一節

一、**[共 45%]:** 填空題(共 15 處，每題 3 分)

請在答案紙上標記下列敘述的數字編號，並將敘述中空格處該填入之適當文字寫於答案紙上。

1. Drive _____ are necessary in multi-boot installations.
2. Broadcast domain is bounded by the router; _____ domain is bounded by the switch.
3. The straight-through cable is for connecting between unlike devices; the _____ cable is for connecting between like devices.
4. In network communication, _____ is used to describe the process of placing one message format into another format so that the message can be delivered across the appropriate medium.
5. Router reassembles the frame with different _____ addresses than the original frame.
6. The **number of calls** to recursively calculate the Fibonacci value of 6 is: _____
7. In OOP, the "has-a" relationship between classes is called _____.
8. In OOP, _____ occurs when an object of one type is referenced by a variable of a different type.
9. A _____ is a communication pathway connecting two or more devices in computer.
10. The implementation of the _____-First Search algorithm uses a queue.
11. The _____ servers are used to translate from private addresses to public addresses.
12. _____ firewalls permit access only if it is a legitimate response to a request from an internal host.
13. The default subnet mask for the IP address 128.127.0.210 is _____
14. A technician can ping the public registered IP address of www.nccu.edu.tw but cannot successfully ping the URL address www.nccu.edu.tw from a host computer. Next, the technician can use "_____" utility to diagnose the problem.
15. _____ memory is a facility that allows programs to address memory from a logical point of view, without regard to the amount of main memory physically available.

二、**[共 20%]:** 根據某漏洞提交平台 2016 年 Web Application Exploits 統計，通報數量前三名分別是 SQL Injection, Cross-Site Request Forgery (CSRF)及 Cross-Site Scripting (XSS)，請問：

a.何謂 Cross-Site Request Forgery 攻擊？(5%) 該如何防範。(5%)

b.何謂 Cross-Site Scripting (XSS)攻擊？(5%) 該如何防範。(5%)

三、**[共 20%]:** 現有如下數列：

39	66	48	25	51	39	10	27

a.請寫出此數列分別經過 BubbleSort, SelectionSort, QuickSort(以最後一個元素為基準 Pivot)演算法自左而右由小排到大執行前三回合的結果。(3%,3%,6%)

b.何謂排序演算法的穩定性(Stability)？(2%) 並請解釋 a 小題中三種排序演算法為何具備或不具備穩定性？(6%)

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四、**[共 15%]:** 請撰寫正規表示式(Regular expression)以檢驗輸入是否符合下列所要求之字串格式：

a.身分證字號：長度 10 個連續字元中間不允許空格或其他符號，第一個字元為英文大寫，第二個字元為 1 或 2，之後 8 個字元為數字。(此處不處理檢查碼之正確與否)

b.市話電話號碼：含兩位數區碼及八位數市話碼，僅允許下列格式：

以號碼 02 29393091 為例

(02)29393091, (02)2939-3091, (02) 29393091, (02) 2939-3091,

02-29393091, 02-2939-3091, 02 29393091, 02 2939-3091

c.電子郵件地址：只接受台灣大專院校電子郵件地址，帳號至少一個字元可以為小寫字母、數字、底線、減號或逗點(逗點不得為第一個字元亦不得連續兩個以上逗點相接)，接著為@字元，之後為網域名稱含多段名稱以逗點銜接，每段網域名稱至少一個字元可以為小寫字母、數字或減號(減號不得為第一字元或最後字元)，網域名稱最後必須以.edu.tw 結尾。

可接受之郵件地址為：example@nccu.edu.tw, xy.123@abc.edu.tw

不可接受之郵件地址為：a@b@c@example.edu.tw, abc..xyz@example.edu.tw, abc@example.com, abc@-example-.edu.tw, abc.example.edu.tw

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。

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考試科目	管理資訊系統 41613	系所別	資訊管理學系/資管組	考試時間	2月18日(六) 第三節

1. Under what conditions can the Internet strengthen supplier bargaining power? Give an example. (15%)
2. Is data a source of competitive advantage? Describe situations in which data might be a source for sustainable competitive advantage. When might data not yield sustainable advantage? (15%)
3. Are advantages based on analytics and modeling potentially sustainable? Why or why not? (15%)
4. What do the acronyms ERP, CRM, SCM, and BI stand for? Briefly describe what each of these enterprise systems does. (15%)
5. How should individuals and firms leverage encryption? (15%)
6. How did the costs of entrepreneurship change over the past decade? What technologies are behind these changes? What does this change mean for the future of entrepreneurship? (15%)
7. Bitcoin's technology is in flux. Based on your experience, what will bitcoin need for it to gain mainstream consumer acceptance? (10%)

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考試科目	計算機概論 4/622	系所別	資訊管理學系・科技組	考試時間	2 月 18 日(上午)第 1 節

一、 在雲運算的環境中，訊息佇列（message queue）常被用為整合工具（integration tool）。試說明訊息佇列的運作方式以及被採用為雲運算環境整合工具的原因。（25%）

二、 在物聯網運算環境中，由於行動裝置在空間中不斷移動，故需要「隨插即用（plug and play）」的服務環境。群播（multicasting）常被作為隨插即用的通訊技術。試說明群播的通訊原理以及適合作為「隨插即用」的服務的原因。（25%）

三、 在資料科學（data science）中，經常採用矩陣運算來解決複雜的問題。現有一程式設計人員擬將矩陣運算應用在金融投資領域。金融投資的一個重要問題是從一組 n 個優質金融商品中，挑選出關聯性最低的 k 個金融商品。假設這 n 個金融商品間的相關係數（correlation coefficient）

$$\rho_{xy} = \frac{Cov(r_x, r_y)}{\sigma_x \sigma_y}$$

為已知，試設計一個矩陣操作的演算法，從 n 個金融商品中，挑出 k 個商品，並使 k 個商品間的相關係數的總和為最小。（50%）

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。

考試科目	資料結構 41623	系所別	資訊管理	考試時間	2月18日(六) 第三節

1. (25%) Dynamic Programming:

Given two strings X and Y, the longest common subsequence (LCS) problem is to find a longest subsequence common to both X and Y.

1.1 (10%) Let L[i,j] denote the longest common subsequence of X[0,i] (the prefix of string X up to the i+1th character) and Y[0,j] (the prefix of string Y up to the j+1th character). Use L[i,j] to write the characterization equation to solve the LCS problem

1.2 (5%) Find the longest common subsequence (LCS) of X and Y, where

X = ACACBAACBCAA
Y = ACBCACA

1.3 (10%) Show the complete table while running the LCS algorithm in 1.2.

2. (25%) Splay Binary Search Tree:

A splay tree is a binary search tree where a node is splayed after it is accessed. "splay" means to move the splay node to the root. For get(k), the splay node is the node that has key k, or the parent node of the exiting external node. For put(T, k), the splay node is the node that has key k.

2.1 (10%) Build a splay tree T by putting the following keys one by one.

21, 4, 12, 7, 35, 28, 19, 48, 16, 13, 22

2.2 (10%) From 2.1, show the splay tree after calling T. get(16)

2.3 (5%) From 2.2, show the splay tree after calling T.get(58)

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3. (20%)Hash Table:

Consider a hash table storing the following keys:

19, 29, 14, 22, 12, 8, 27, 32, 53, 25, 54, 42, 26, 33, 36.

Let N=17. h(k) = k mod 17.

3.1 (10%) Show the hash table that handles collision with separate chaining.

3.2 (10%) Show the hash table that handles collision with double hashing.

Let d(k) = 11- (k mod 11).

4. (30%) Tree Traversal:

4.1 (10%) Represent the expression 7 * 3 * 5 -22 < 105 + 2 * (3 + 5) using a binary tree. (An internal node stores an operator, e.g., *, +, and an external node stores a value, e.g., 3, 5.)

4.2 (10%) Write the pseudo code that evaluates such kind of an expression.

Hint: traverse the tree from the root node.

4.3 (10%) Write the pseudo code that prints a binary tree expression given the root node v with correct parentheses, i.e., ((((7 * 3) * 5) -22) < (105 + (2* (3 + 5)))).

Hint: traverse the tree from the root node.

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。