國立中央大學　資訊工程學系

105 學年度 碩士在職專班 招生入學考試命題紙

科目：　計算機概論 (含資料結構)　第一面　共三面

**Note: 1.請將題目序號標示清楚並將答案填寫在答案紙中**

**題組 1 (每題 5 分)**

1. 下列有關於階層式記憶體的描述，何者有誤？ (A) 層次越接近 CPU 的記憶體，容量越小且存取速度越快 (B) SRAM 的存取速度比 DRAM 快 (C) SRAM 內資料不因電腦關機而消失 (D) 快取記憶體得配置於 CPU 內部及外部，以提高 CPU 的存取速度

2. 試問下列邏輯運算式，何者有誤？

(A) X ・ (X＋Y) = X ;
(B) X ・ (Y＋Z) = (X ・ Y)＋(X ・ Z) ;
(C) (X＋Y)' = X' ・ Y'
(D) X＋X ・ Y = X＋Y

3. 在 CPU 執行速度為 2000 MIPS 的電腦中，執行 400 個指令的程式要花多少時間？ (A) 20ms (B) 200ms (C) 20ns (D)200ns

4. 數字系統 16 進位的 12D 轉換為 8 進位為以下何者? (A)432 (B)367 (C)426 (D)455。

5. 試問$(4D.2A)_{16}-(1101.1010101)_2$ 的計算結果應是多少？ (A) $(3F.1)_{16}$ ; (B) $(3F.8)_{16}$; (C) $(40.8)_{16}$; (C) $(40.1)_{16}$

6. 256KB 的 RAM，其起始位址為 10000H，則其終止位址為：
(A). 4FFFFH; (B). 13FFFH; (C). 2FFFFH; (D). 40000H

7. CPU 在執行程式，當需至主記憶體、快取記憶體（Cache Memory）及輔助記憶體抓取資料時，其讀取之先後順序為 (A) 快取記憶體、主記憶體、輔助記憶體; (B) 主記憶體、快取記憶體、輔助記憶體; (C).主記憶體、輔助記憶體、快取記憶體; (D). 快取記憶體、輔助記憶體、主記憶體

8. CPU 中的 ALU 主要是負責 (A).資料存取; (B). 匯流排控制;(C). 執行算術邏輯運算; (D). 輸入輸出控制

9. 程式計數器(Program Counter)的作用為何？ (A)存放錯誤指令的個數 (B)存放資料處理的結果 (C)存放程式指令 (D)存放下一個要被執行的指令位址

10. 下列何者是 UNIX 最具原創性的發明？(A)虛擬記憶體(B)管線化(C)多工(D)樹狀目錄

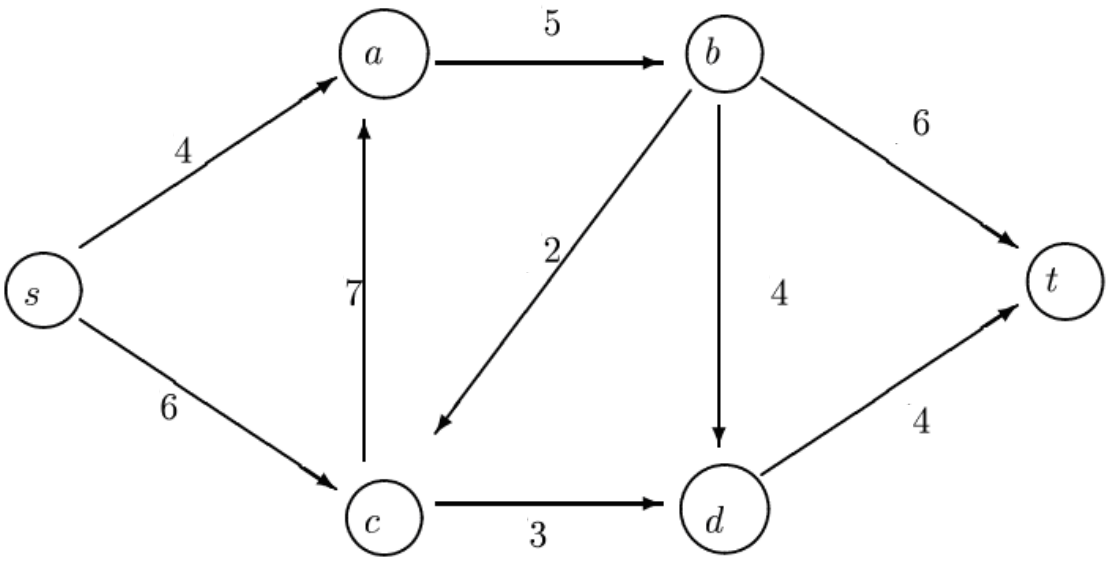
國立中央大學　資訊工程學系

105 學年度 碩士在職專班 招生入學考試命題紙

科目：　計算機概論 (含資料結構)　

**題組 2 (每題 10 分)**

1. Please find the maximum flow assignment for the following flow network. The number on each edge is its capacity.




In the maximum flow assignment, what is the flow for edge (c,d)?
(A) 0 (B)1 (C) 2 (D) 3 (E) None are correct

2. Rearrange the following array A (Note that A[0] is not used.) into a max heap and then sort it using the bottom-up approach

| A[1] | A[2] | A[3] | A[4] | A[5] | A[6] | A[7] | A[8] | A[9] | A[10] | A[11] | A[12] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 | 19 | 73 | 12 | 69 | 23 | 64 | 31 | 21 | 19+ | 82 | 9 |

a. During constructing the max heap, one pass is

| Pass k | 30 | 19 | 73 | 31 | 82 | 23 | 64 | 12 | 21 | 19+ | 69 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

Which numbers will be moved in the next pass? Please choose the answer with the order after they are moved.
(A) 19, 69, 73 (B) 19, 69, 82 (C) 73, 69, 19 (D) 82, 69, 19 (E) None are correct

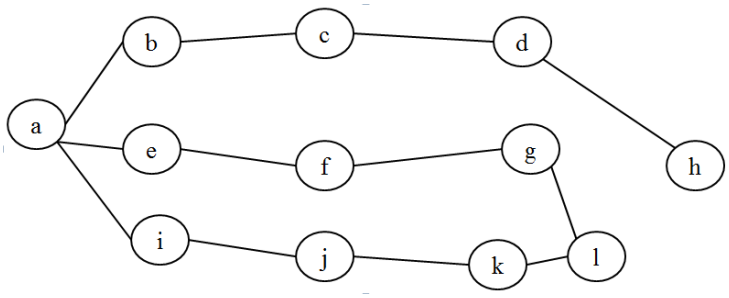
b. During the sorting process, one pass is

| Pass k | 21 | 20 | 19+ | 9 | 19 | 23 | 30 | 31 | 64 | 69 | 73 | 82 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

Which numbers will be moved in the next pass? Please choose the answer with after they are moved.

(A) 20, 19, 21 (B) 20, 23, 19+ (C) 19+, 20, 23 (D) 31, 73, 69 (E) None are correct

3. Show the results of BFS and DFS traversals for the following graph (a is the starting point)




4. The Fibonacci rabbits

Originally 1202, Fibonacci was presented with a problem of how quickly the rabbit population will grow in ideal conditions:

***A certain man put a pair of rabbits in first month. How many pairs of rabbits can be produced from that pair in several months if it is supposed that every month each pair produces a new pair which from the second month on becomes productive? It means the rabbit produced in first month will produce a pair of rabbits in third month.***

Please write a program to calculate the number of rabbits and display the number of rabbits existed in the 19th month, 20th month, and 21 th month. (Hint: fibonacci(0) = 0, fibonacci(1) = 1)

5. Please write a program that can calculate three types of k-dimension vector operations (k<=10): addition, subtraction, inner product.