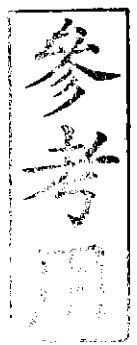


# 國立中央大學104學年度碩士班考試入學試題

所別：生醫科學與工程學系生物醫學工程碩士班 生醫訊號與器材組(一般生) 科目：計算機概論 共    頁 第    頁  
 本科考試可使用計算器，廠牌、功能不拘 \*請在答案卷(卡)內作答



I. 選擇題 (每題 4 分) (20 points)

1. A computer has 2 Giga Bytes of memory. Each word in this computer is 16 bytes. The computer needs at least \_\_\_\_\_ bits to address (定址) any single word in memory. (Hint: KB, MB, GB, TB, PB, ...)  
 a. 26      b. 27      c. 28      d. 29      e. None of the above
2. The 80-20 rule is important to memory system design. The rule says that  
 a. The size of the registers is about 20% of the size of the cache, and the size of cache is about 80% of the main memory.  
 b. A computer usually uses 80% of memory space for 20% processes.  
 c. While executing a typical computer program, about 80% of the data in the memory are not modified. About 20% of the data are re-written into the memory.  
 d. A computer usually spends 80% of the time to access 20% of the data.  
 e. None of the above.
3. Which one of the following is the two's complement representation of -8 using 8-bit allocation?  
 a. 11111000      b. 11110111      c. 10001000      d. 11110110  
 e. None of the above
4. Which one of the following is not true?  
 a. The idea of a universal computational device was first described (描述) by Alan Turing.  
 b. von Neuman Model defines a computer which is based on the Turing Model.  
 c. von Neuman proposed (提出) that, since program and data are logically (邏輯上) the same, programs should also be stored in the memory of a computer.  
 d. A step-by-step solution to a problem is called an algorithm.  
 e. All of the above.
5. Convert the decimal number 0.3 to its corresponding octal (八進位) value. Notice that (注意) the following choices only show four digits, which means you only need to calculate the solution for the first four digits.  
 a) 0.375    b) 0.1324.....    c) 0.2121.....    d) 0.3433.....    e) 0.2314...

II. 程式題 (30 points)

1. 簡易迴圈程式設計(語法請使用 Matlab, Java, C, 或者 C++其中一種):

1.1 請寫出一個程式，計算  $\sum_{i=1}^n (i * (i+1))$ ，其中 n 是使用者輸入的正整數 (8 分)

1.2 請寫出一個程式，計算  $\sum_{i=1}^n \sum_{j=1}^i i * j$ ，其中 n 是使用者輸入的正整數 (8 分)

2. 簡易遞迴程式設計(語法請使用 Matlab, Java, C, 或者 C++其中一種): (14 分)

給定兩個數值 x, y, 則它們的最大公因數 gcd 的定義如下:

$$\text{gcd}(x, y) = \begin{cases} x & \text{if } y = 0 \\ \text{gcd}(y, x \bmod y) & \text{otherwise} \end{cases}$$

請寫出一個程式計算  $\text{gcd}(x, y)$ , 其中變數 x 和 y 都是使用者輸入的數值

III. 簡答題 (50 points)

1. Explain your personal experiences in programming by Matlab, Java, C, C++ or other software. What was the project about in programming? Describe the special features in the program software, and try to compare different programming software. (12 points)
2. A digital gray-scale picture displayed on the screen by a rectangular array containing 512 columns and 256 rows of pixels. If each pixel is stored in the format of floating points, how many byte-size memory cells are required to hold the entire picture? (12 points)
3. Draw the search tree that is generated by the depth-first search with the assistance of the heuristic search technique to solve the following eight-puzzle from the start state in the following figure. (12 points)
4. Please describe the programming logics if you are requested to solve the following questions (just write down your thoughts, no need to list the code details) and also the special consideration during the programming:
  - a. Remove all the comment or description parts in every code file (Matlab, Java, C, or C++). (8 points)
  - b. Given a measured biomedical signal and one predefined equations (example: the cooling process of hot water and the equation of  $T(t) = T(0) \cdot e^{-\frac{t}{\tau}}$  °C), try to use the predefined equation to fit the acquired data. (6 points)

1	3	5
4	2	
7	8	6