

國立中央大學 資訊工程學系  
103 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) 第一頁 共二頁

Note: 1. You can write down your answers in English or Chinese (你可以用中文書寫或英文書寫來回答問題)

2. 請依序將答案填寫在答案紙中

1. (6%) Please convert the decimal number **165.625** to different number systems:
  - 1.1 Binary format
  - 1.2 Hexadecimal format
  
2. (6%) Evaluate the following logical bitwise operations.
  - 2.1  $(1000)_8$  AND  $(1010)_8$  OR  $(1010)_8$
  - 2.2  $(CD)_{16}$  XOR  $(0F)_{16}$  AND  $(80)_{16}$  XOR  $(F0)_{16}$
  
3. (10%) Explain the following concepts of computer networks:
  - 3.1 Explain the difference between User Datagram Protocol (UDP) and Transmission Control Protocol (TCP).
  - 3.2 Explain the difference between an MAC address and an IP address.
  
4. (10%) Deadlock is an important issue in process management:
  - 4.1 What is deadlock?
  - 4.2 What are the four necessary conditions for deadlock?
  
5. (10%) Explain the concept of black-box testing. Then, list and explain two black-box testing approaches.
  
6. (10%) What are the two categories of the data compression methods? What are the differences between them?
  
7. (10%) Answer the following questions regarding object-oriented programming.
  - 7.1 What is polymorphism? What is overriding? What is the relationship between polymorphism and overriding?
  - 7.2 Explain how polymorphism works in C++ (or Java if you know Java better).

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8. (10%) Explain the following concept:
- 8.1 What is the stack data structure?
  - 8.2 Write a class template of “Stack” in C++ or Java. The class is used to create different types of stacks (i.e. a stack of integers, a stack of doubles, etc...).
9. (10%) Write a recursive function  
**power(int base, int exponent)**  
that, when invokes, returns  $base^{exponent}$ . For example,  $power(2,4) = 2*2*2*2$ . (You are asked to write the program in a formal format, which should be very similar to C, C++, or Java programming)
- 10.(8%) Write a program that reads  $N$  positive numbers in floating format as the input, calculates the average of the  $N$  input numbers, and shows the result in the standard output. (You are asked to write the program in a formal format, which should be very similar to C, C++, or Java programming)
- 11.(10%) Write an interactive program that performs the following tasks (You are asked to write the program in a formal format, which should be very similar to C, C++, or Java programming):
- First, it reads 20 sorted integers as the input.
  - Second, it asks the user to input another integer X, and then reads the integer X.
  - Third, it uses “binary search” to find whether X is in the 20 sorted integers. If a match is found, it returns the position of X in the list (starting from 1). It returns 0 if X is not in the 20 sorted integers. It returns -1 otherwise.