

# 大同大學 97 學年度研究所碩士在職班入學考試試題

考試科目: 計算機概論

所別: 資訊工程研究所

第 1/1 頁

註: 本次考試 不可以參考自己的書籍及筆記; 不可以使用字典; 不可以使用計算器。

1. Give a C declaration of a binary tree that contains integers. Give an algorithm that traverses a binary tree in level order. (10%)
2. Write a recursive function in C that returns the number of leaf nodes in a binary tree. (10%)
3. Give the five components of the von Neumann architecture. (10%)
4. Explain the three pillars of object-oriented programming, that is, the three most essential characteristics. (10%)
5. What are the steps involved in a fetch-execute cycle? (10%)
6. Explain the following addressing modes: relative, indexed, and indirect. (10%)
7. Simplify the following Boolean expressions:
  - i.  $(a + b)(a + b')$  (5%)
  - ii.  $x'yz + xy'z' + xyz + xyz'$  (5%)
8.
  - a. Give the seven layers of the network as set forth by the Open Systems Interconnection Basic Reference Model (OSI Model for short). (5%)
  - b. Associate each of the following functions with its respective layer: (5%)
    - i. In charge of end-to-end connections and reliability control
    - ii. Defines the format of the data sent over the connections
    - iii. Provides network services to the end-users
    - iv. Defines the cable or physical medium itself
    - v. Provides data representation and encryption
    - vi. Provides path determination and logical addressing
    - vii. Controls interhost communication
9. There exists a binary tree or trees, each of whose nodes contains a letter. In a postorder traversal, the sequence of output is  
E D A C G F B H  
Suppose that the number of children of the nodes are:  
A B C D E F G H  
1 2 0 1 0 1 0 2  
Draw the binary tree or trees. (10%)
10. Suppose you were to design a CPU with six instructions  $I_1, I_2, I_3, I_4, I_5,$  and  $I_6,$  having the probability of occurrence  $P_1 = 0.4,$   $P_2 = 0.3, P_3 = 0.01, P_4 = 0.08, P_5 = 0.06,$  and  $P_6 = 0.15.$ 
  - a. Construct the opcodes ( $C_1, \dots, C_6$ ) using Huffman's method. You must show the final Huffman tree. (5%)
  - b. Calculate the average number of opcode bits per instruction. (5%)