

# 大同大學 95 學年度研究所碩士班入學考試試題

考試科目:計算機概論

所別:資訊工程研究所

第 1/2 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。

- I. Single Choice Questions. A correct answer will earn you 3 points while 1 point will be deducted for each wrong one. (Total 45 points)
- (1) In the open addressing method, if two records hash to the same address, then we say these two records \_\_\_\_ with each other. (1) interfere (2) collide (3) coexist (4) link.
  - (2)  $O(f(n))$  is a (1) variable (2) function (3) set (4) data structure.
  - (3) Which of the following is not considered memory? (1) hard disk (2) register (3) RAM (4) cache.
  - (4) \_\_\_\_\_ technique may be used to improve the performance of the Quicksort. (1) randomization (2) normalization (3) centralization (4) generalization.
  - (5) The Gödel number is (1) an encryption method (2) a set of numbers exhibiting special mathematic property (3) a representation of a program (4) a sequence generated by some function.
  - (6) Firewire is a (1) serial bus interface (2) publishing tool (3) browser (4) peripheral.
  - (7) This computer is not assigned a static IP. \_\_\_\_ is used to obtain its IP address. (1) ICMP (2) BGP (3) RIP (4) DHCP.
  - (8) The halting problem is \_\_\_\_\_. (1) solvable in exponential time (2) solvable in polynomial time (3) solvable in deterministic time (4) unsolvable.
  - (9) In the public key mechanism, the \_\_\_\_ key is used to encipher the data. (1) secret (2) public (3) shared (4) private.
  - (10) \_\_\_\_ supports fragmentation. (1) IP (2) UDP (3) TCP (4) Ethernet.
  - (11) The operating system is usually **not** responsible for (1) file management (2) memory management (3) device management (4) program management.
  - (12) Which of the following properties is **not** included in the probing function in open addressing? Let  $m$  be the size of the hash table and  $n$  be the number of records. (1) It must probe  $m$  different slots if the table is full. (2) It may probe the same location no more than one time. (3) It will stop whenever an empty slot is reached. (4) There are  $n$  different probing sequences in linear probing.
  - (13) Which of the following is usually not considered in the software quality? (1) operability (2) maintainability (3) availability (4) transferability.
  - (14) A binary heap is stored in an array. Then, the  $i^{\text{th}}$  element in the array is the parent of (1)  $(i+1)^{\text{th}}$  (2)  $2i^{\text{th}}$  (3)  $i^2$  (4)  $(2i-1)^{\text{th}}$  element in the heap.
  - (15) Which of the following functions is **not** included in the process of converting music sound to digital signal? (1) demodulation (2) sampling (3) coding (4) quantization.
- II. Essay Questions. (Total 25 points)
- (1) Please describe the main advantage of the 2's complement representation. (5 points)
  - (2) If hashing is used in an application requiring constant inserting and deleting records, please suggest any maintenance that will make the system more efficient. (5 points)
  - (3) Two programs, A and B, are designed to carry out the same function. The order of growth of the two programs are expressed as  $f_A(n)$  and  $f_B(n)$ , respectively. Discuss the performance of the two functions given  $O(f_A(n)) = O(f_B(n))$ . (5 points)
  - (4) Discuss the advantages of the layered structure in the OSI reference model. (5 points)
  - (5) A graph can be stored in an adjacency matrix or an adjacency list. Discuss the pros and cons of these two approaches. (5 points)

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III. Calculation Questions. (Total 30 points)

(1) A partial pseudo code for the counting sort is provided below. Please complete it without changing the part provided below. To get the full points, the resulting counting sort needs to be stable. (10 points)

/\* A is the source array for the sorting.

We assume the elements are integers and vary between 1 to k.

k is the maximum number among the elements in A.

B is the destination array for the sorting. \*/

Counting-Sort(A, B, k)

  for i ← 1 to k

    do C[i] ← 0

  for j ← 1 to length[A]

    do C[A[j]] ← C[A[j]]+1

D[0] ← 1

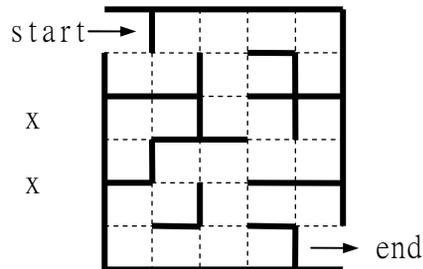
C[0] ← 0

  for i ← 1 to k

    do D[i] ← D[i-1] + C[i-1]

  {fill in your code}

(2) A maze is depicted below. The thick lines are walls that block the way. Please use a tree to represent the maze below. Then, use the tree to find the path from the start to the end. (10 points)



(3) Assume a magnetic disk of radius  $r$  is evenly divided into  $x$  tracks and  $y$  sectors. Please compute the density ratio of the most and least dense blocks. Please assume the hole for the spindle is  $r/(x+1)$ . (10 points)