

# 大同大學九十四學年度碩士班入學考試試題

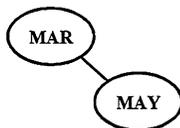
考試科目：計算機概論

所別：資訊工程研究所

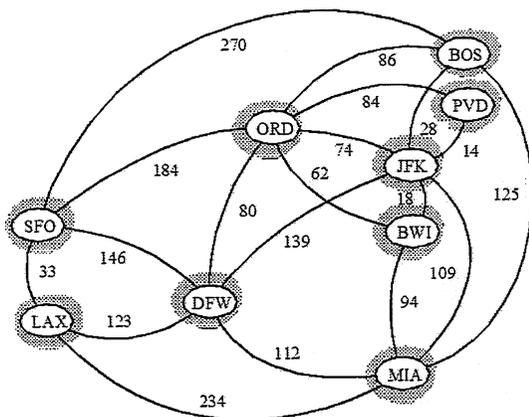
備註：本次考試禁止使用任何計算器，字典，不可參考書籍

- 一. Multiple-Choice Questions: (1.5 points each)
- Which files are raster-graphics format?  
a. GIF and JPEG b. bitmap and SVG c. GIF and SVG d. bitmap and MPEG
  - \_\_\_\_\_ is a code used by the Java language to represent characters.  
a. ASCII b. Extended ASCII c. EBCDIC d. Unicode
  - In \_\_\_\_\_ number representation, there is one representation for 0.  
a. sign-and-magnitude b. one's complement c. two's complement d. non of the above
  - \_\_\_\_\_ runs on the web server.  
a. Java applet b. XML c. JSP scriptlet d. all of the above
  - \_\_\_\_\_ is a memory type with traditional flip-flop gates to hold data.  
a. SRAM b. DRAM c. ROM d. all of the above
  - MP3 employs \_\_\_\_\_ compression.  
a. only lossy b. LZ c. both lossy and lossless d. a form of Shannon encoding to achieve additional
  - The \_\_\_\_\_ controller is a serial device that connects slow devices such as the keyboard to the computer.  
a. SCSI b. FireWire c. USB d. IDE
  - In the \_\_\_\_\_ method to synchronize the operation of the CPU with the I/O device, the I/O device informs the CPU when it is ready for data transfer.  
a. programmed I/O b. interrupt-driven I/O c. DMA d. isolated I/O
  - Multiprogramming requires a \_\_\_\_\_ operating system.  
a. batch b. time-sharing c. parallel d. distributed
  - \_\_\_\_\_ is multiprogramming with swapping .  
a. Partitioning b. Paging c. Demand paging d. Queuing
  - In \_\_\_\_\_, only one program can reside in memory for execution.  
a. monoprogramming b. multiprogramming c. partitioning d. paging
  - To prevent \_\_\_\_\_, an operating system can put resource restrictions on processes.  
a. starvation b. synchronization c. paging d. deadlock
  - A process in the ready state goes to the running state when \_\_\_\_\_.  
a. it enters memory b. it requests I/O c. it gets access to the CPU d. it finishes running
  - \_\_\_\_\_ can occur if a process has too many resource restrictions.  
a. Starvation b. Synchronization c. Paging d. Deadlock
  - The \_\_\_\_\_ is a pointer that identifies the next element in the linked list.  
a. link b. node c. array d. a or b
  - In the \_\_\_\_\_ collision resolution method, a node can hold multiple pieces of data.  
a. open addressing b. Linked list c. Bucket hashing d. a and b
  - To access a record randomly, you use a(n) \_\_\_\_\_ in the index to find an address.  
a. address b. key c. synonym d. a or b
  - To traverse a list, you need a \_\_\_\_\_ pointer.  
a. null b. walking c. beginning d. insertion
  - The compiler consists of a \_\_\_\_\_ and a \_\_\_\_\_.  
a. preprocessor; loader b. translator; loader c. preprocessor; translator d. linker; preprocessor.
  - Which of the following sorting algorithms is not a comparison sort?  
a. Insertion-Sort. b. Merge-Sort c. Radix-Sort. d. Heap-Sort.
  - Which of the following statements is incorrect?  
a. A minimum spanning tree for a connected graph is not unique. b. A minimum spanning tree for a connected graph is unique if all edge weights are distinct. c. Dijkstra's algorithm can solve the all-pairs shortest-paths problem. d. Dijkstra's algorithm can solve the single-source shortest-paths problem in which edge weights may be negative.
  - What is the running time of *Quicksort* on an array of  $n$  distinct elements that is already sorted in decreasing order?  
a.  $O(n^2)$ . b.  $O(n \lg n)$ . c.  $O(\lg n)$ . d.  $O(n)$ .
  - What does the  $n$  mean in the statement "The running time of an algorithm is  $\Theta(n^2)$ ."  
a. Number of execution steps. b. Input size. c. Output size. d. None of the above.
- 二. Fill in the blanks: (1.5 points each)
- Saying a memory is 133MHz means that the memory can be accessed at 133000000 \_\_\_\_\_ per second.
  - There are \_\_\_\_\_ bytes of memory in the 256 MB machine.
  - A \_\_\_\_\_ language is used to describe hardware rather than a program to be executed on a computer.
  - The \_\_\_\_\_ is the language standardized by the ANSI and ISO for use on relational data bases.
  - \_\_\_\_\_ language processing deal with languages that humans use to communication such as spoken language.
  - Inverting the output of an AND gate is equivalent to inverting the individual signals first, then passing them through a(n) \_\_\_\_\_ gate.
  - Class \_\_\_\_\_ problems are the problems that can be solved with one processor in polynomial time.
  - \_\_\_\_\_ stands for revolutions per minute. It is measure of how fast a disk revolves.
  - Internet Engineering \_\_\_\_\_ Force maintains archives that relate to the Internet and some activities, including keyword-indexed library of RFCs.
  - The Big-O notation, \_\_\_\_\_, with its definition that the algorithms of this type successively cut the amount of data to be processed in half at each step.
  - MP3 is short for MPEG \_\_\_\_\_ audio layer 3 file. MPEG is an acronym for the Moving Picture Experts Group.
  - A stack is also called a LIFO while a queue is called a \_\_\_\_\_.
  - \_\_\_\_\_ -sort is a sorting algorithm that uses the divide-and-conquer technique.
- 三. Answer the questions and calculations:

1. (12 points) To design a required FSM for implementing the serial adder. Let P and Q denote the states where the carry-in values are 0 and 1, respectively. The output value,  $s$ , depends on both the state and the present value of the input  $a$  and  $b$ .
  - (a). Sketch the state diagram.
  - (b). Present the corresponding state-assigned table.
  - (c). Repeat the problems (a) and (b) and try to achieve the same objective using a Moore-type FSM.
2. (4 points) Normalize the following binary floats . Explicitly show the value of the exponent after normalization.
  - (a). 1.10001    (b).  $2^{-2} \times 101.110011$
3. (4 points) Transform the fraction 0.4 to
  - (a) a binary of 6 bits;    (b) IEEE single-Precision format.
4. (8 points) An AVL tree is a balanced binary search tree that is height balanced: for each node  $x$ , the heights of the two subtrees of  $x$  differ by at most 1. After a node is inserted, the tree may need to be rebalanced to maintain height balanced. Given an AVL tree below and assume insertions are made in the order NOV, AUG, APR, and JAN. Draw the rebalanced AVL tree after each insertion. (Note. There should be four AVL trees, one for each insertion)



5. (6 points) Let  $w_i$  represent the weight of the  $i^{\text{th}}$  edge selected from a graph by some minimum spanning tree algorithm. Namely,  $w_1$  is the weight of the first selected edge,  $w_2$  is the weight of the second selected one, and so on. Given the graph below, please give the value of  $w_i$  for each selected edge  $i$  in the increasing order of  $i$  (按  $i$  遞增的順序) (i.e.,  $w_1, w_2, \dots$ , etc.) if the algorithm is
  - (a) Kruskal's algorithm.
  - (b) Prim's algorithm with the root vertex ORD.



6. (a) (2 points) Determine what the following recursive C function computes.
  - (b) (3 points) Write an iterative function to accomplish the same purpose.

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int func(int n)
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