國立彰化師範大學 99 學年度碩士班招生考試試題

系所：數學系　　　　　組別：丙組　　　　　科目：計算機概論（含資料結構）

1. (1) Store －12 in an 8-bit memory location using two's complement representation. (2%)

   (2) Retrieve the integer that is stored as 11001110 in two's complement representation. (2%)

   (3) Show the IEEE floating-point single precision representation (Excess_127, sign:1 bit, exponent: 8bits, mantissa: 23bits) of the decimal number －5.25. (2%)

   (4) What are the largest positive number and smallest number in IEEE floating-point single precision representation? (4%)

2. Please show the truth table of the following logic gate. (4%)
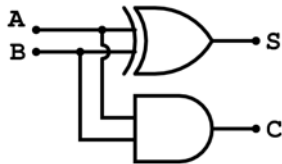
3. What is the printing result of A and B if they are (1) passing by value; (3%) (2) passing by reference.(3%)

   ```
   main ()
   {   A = 2, B=6;
       change(A, B);
       printf(A);
       printf(B);}
   ```

   ```
   change(A, B)
   {   temp = A;
       A = B;
       B = temp; }
   ```

4. Please briefly explain the following items: (10%)

   (1) data mining

   (2) the 80-20 rule of cache

   (3) register

   (4) parity bits technique

   (5) starvation

5. Quick sort is a well-known sorting algorithm.

   (1) Please write the pseudo-code of quick sort; (5%)

   (2) Please show the detailed sorting result in the first loop while quick sort sorts the following list

   　　41　24　76　11　45　64　21　69　19　36; (5%)

   (3) Please derive the worst-case time complexity of quick sort. (5%)

6. Please briefly explain your answers:

   (1) What data structure is suitable for round-robin job scheduling? (4%)

   (2) What data structure is most suitable for an efficient implementation of priority queue? (4%)
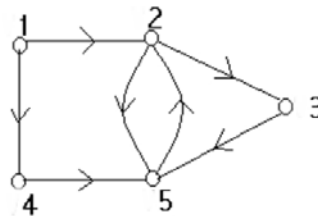
7. Please show the traversal result of the right binary tree:

(a) pre-order; (4%)

(b) in-order; (4%)

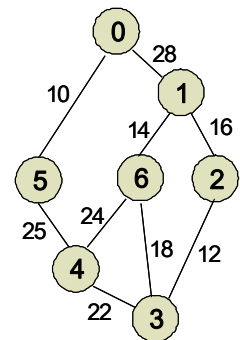(c) breadth-first search. (4%)
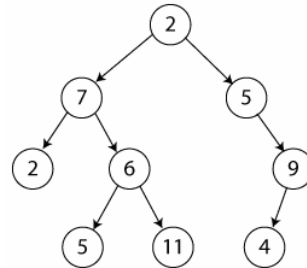
8. Given the right direct graph, please write its

(a) adjacency matrix; (4%)

(b) edge list; (4%)

(c) double-linked list. (4%)

9. Please find the minimum-cost spanning tree of the right graph by using

(a) Prim's algorithm; (4%)

(b) Sollin's algorithm. (4%)

(PS. You have to write the immediate step or briefly describe your reasons)

10. Compare the worst-case search times for a 2048-element block of data. How many comparisons are required for

(a) binary search; (3%)

(b) hashing function without collision. (3%)

11. (a) What is a max heap tree? (4%)

(b) Given the following graph, please show how the two elements 20 and 15 in the graph are taken out. (5%)

(PS. You have to show the immediate steps)